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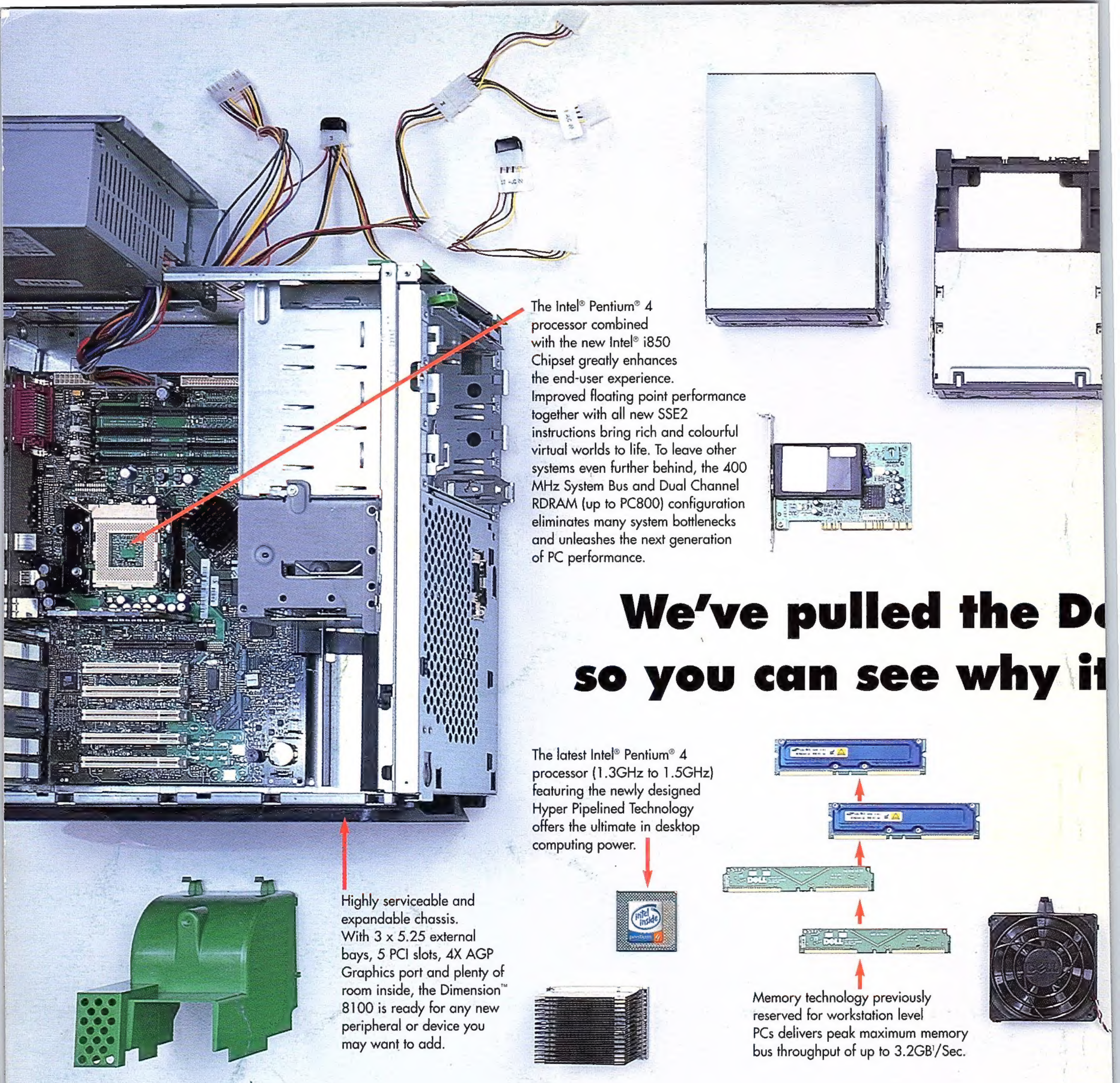

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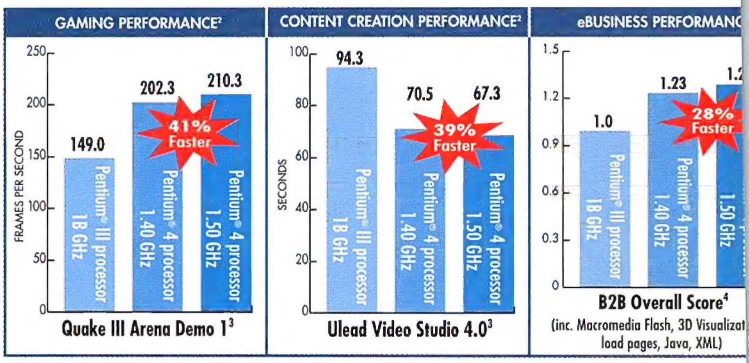

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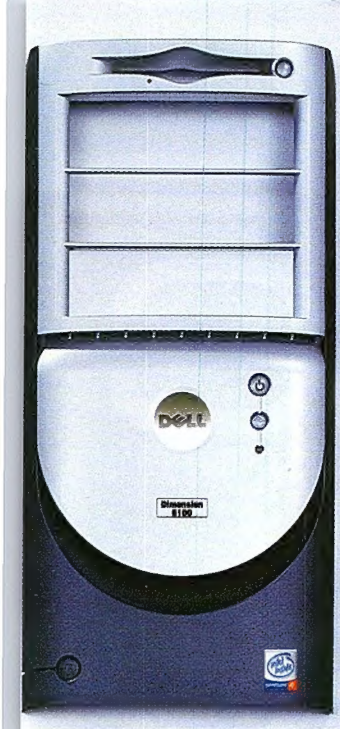

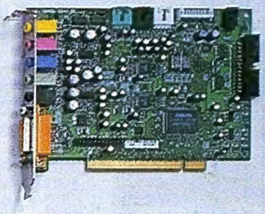

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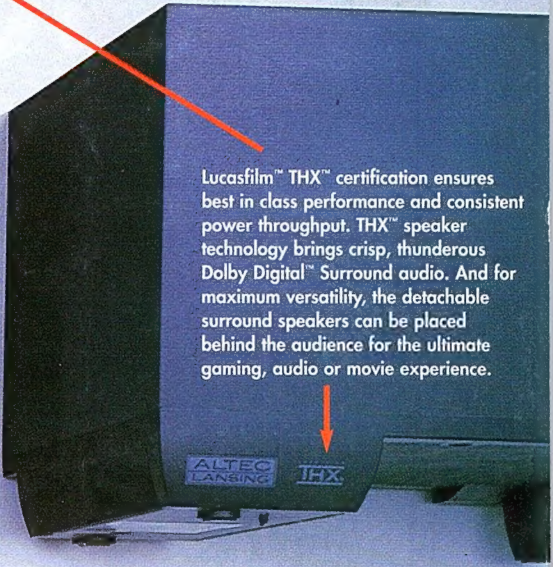

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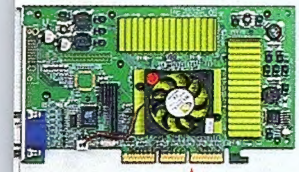

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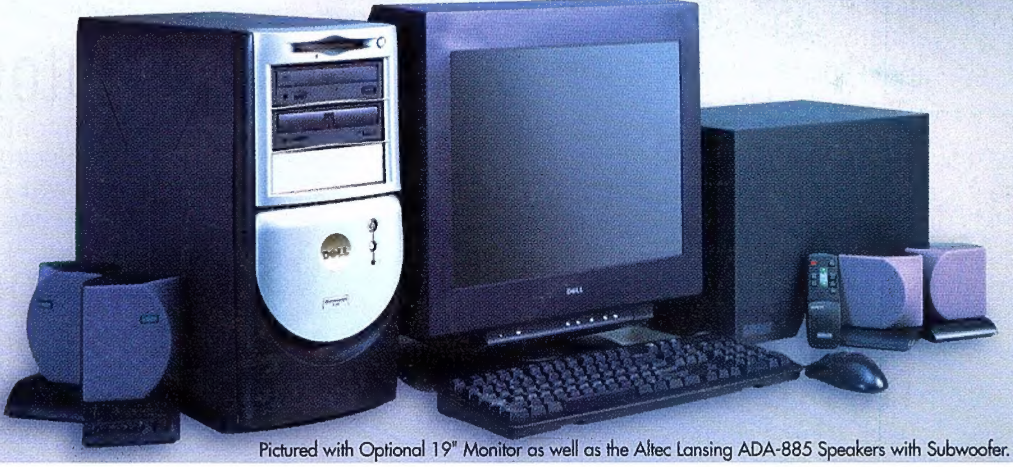

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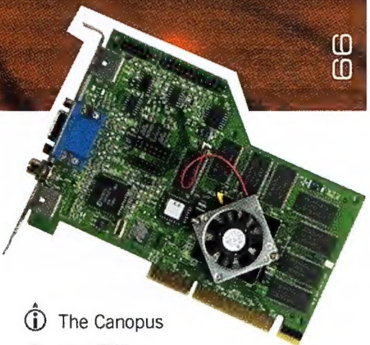


ⓘ The Canopus Spectra TNT. Funny shape, funny name.

SFX

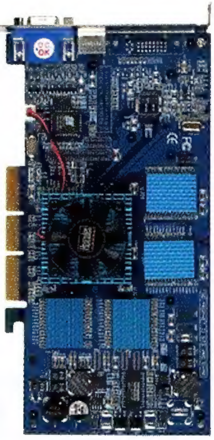
The evolution of 3D

The world of Special Effects has come a long way since the Voodoo dominated early years. atomic looks back at these turbulent years in 3D and at how cards have evolved to today's rendering beasts. Because we like a good fight, we have taken these beasts, benchmarked them to within an inch of their lives and worked out which gives you the best value for money.

Plus we predict the future. Each chipset makers' plans foretold by our labcoats.

66

> **"The Diamond EDGE 3D utilised a chipset called the NV1 from a relatively unkown company called NVIDIA"**



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Cover image of Lei Fang from Dead or Alive 2 for the PlayStation 2. Thanks to Sony Computer Entertainment Australia for supplying the image.

Graphics 2D For

Six years ago I attended the launch of a new video card from Diamond. My colleagues and I wondered, while scoffing juice and cake before the show, whether the 'Diamond Edge' would be the card to knock the Tseng Labs ET4000 off as King of Cards. We all used the ET4000, wonderful card it was, SVGA was actually feasible, sort of... Could it get any better? Oh yeah... and how!

When the friendly American Diamond guy fired up the Edge, straight after talking a bit about some new company called 'NVIDIA' which had provided the Edge's chip (sensibly named the 'NV1'), we saw the familiar site of the Best of Sega Saturn. See, the big deal with the Edge was that it ran ported Sega Saturn games. It also had a special input for Saturn control pads. But that's all it did. There were only ever three or four games released for Edge, all Saturn ports and it was hell expensive.

Back then we were in the midst of Saturn worship, at that time typically playing a solid couple of hours of Virtua Fighter every night. As a result, our collective industry response was underwhelming. We all had Saturns anyway, and just couldn't see the point. Winner: ET4000. Big joke: 3D acceleration.

Ironically, this early developing situation was one of upstart NVIDIA trying to ride the success of Sega's hardware. How things change...

How they change for the better! The intervening years saw 3D acceleration rise as the most significant paradigm leap PC gaming has yet experienced. It took a while though, and there was surprising reluctance from the industry to adopt this new, obviously superior technology. A big shout out here to John Carmack, who was arguably responsible for the uptake of these cards. While much of Carmack's motive to support Voodoo Graphics was its excellent support for Carmack's preferred API OpenGL. His game; Quake, was just too compelling in hardware mode to ignore. But ignored it was, by the retailers. This held up progress for about a year, as major retailers – including the largest and most prominent game specialists in Australia, refused to carry the cards. Only when the numbers of desperate customers overwhelmed them did they take it seriously.

And the rest, as they say, is history. It's a fascinating story. Read all about it, as they also say, in our feature story this month. Great work from John. We'd like to thank Nick at Creative for his help getting chipset release dates right.

We may be a young industry, but our history is deep and detailed.

Ben Mansill, Editor

The Men of Atomic in the Labs, L to R: Ashok Zaman Bennett Ring, John Gillooly, Ben Mansill, Tim Dean, David Hollingworth

The boys in the midst of a heavy benchtesting frenzy

atomic

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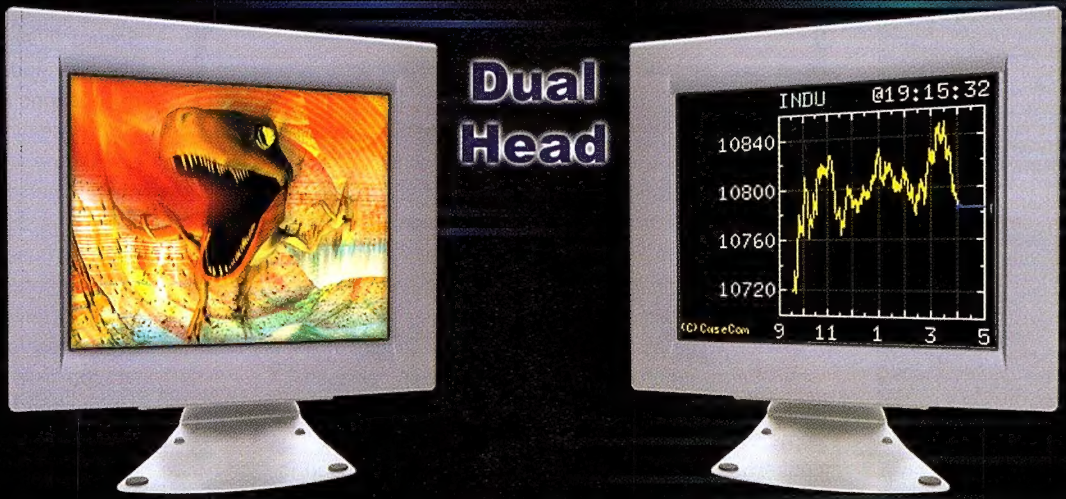

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Sega Shenanigans

The past few months have been a whirlwind of rumour and innuendo about the future of Sega. Merger talks with Nintendo; Sega developing for the GameBoy Advance, PS2 and Xbox, Dreamcast production ceasing, Dreamcast on a PCI card for the PC, and even that the Xbox will be backwards compatible with Dreamcast games have all been hot topics of discussion.

These were all strongly denied until the 24th January, when Sega Japan released several press releases addressing the concerns of the public, and confirming some of the rumours. The major announcement concerned the cessation of Dreamcast production in March of this year. The company is undergoing a major restructure in order to focus purely on game development rather than its traditional hardware base. Sega announced an extensive lineup of new games to appear for the Dreamcast over the next year, including some big sequels such Crazy Taxi 2, House of the Dead 3, Virtua Tennis 2 (hotly anticipated in the atomic offices) and an unnamed sequel to Space Channel 5.

The most surprising news was that Sega confirmed they are developing software for the PS2 and GameBoy Advance, a move that would have been seen as impossible only a year ago. Sonic the Hedgehog is making a move to GameBoy advance, whilst the PS2 receives the new Space Channel 5 game, Virtua Fighter 4 and a new Sakura Wars title. Sega are also apparently in negotiations with Microsoft and Nintendo about development for the Xbox and Gamecube, but nothing is confirmed.

Accompanying this was a commitment to pursue plans to develop the Dreamcast architecture for set top boxes in conjunction with leading set top box maker, Pace, PCs and other 'home appliances' (Jet Set Radio on the microwave maybe?).

It is a sad day seeing Sega leave the hardware market, after moving into console development with the Master system in the mid 1980s, Sega released the Genesis in 1989 and the Saturn in 1995. After the early years of the Colecovision and Atari 2600, the console world was dominated by the superpowers of Sega and Nintendo. With the release of the Sony PlayStation this became a three-way tussle for supremacy. The 1999 release of the, still impressive, Dreamcast shot Sega back into the limelight, with the console breaking records with 500,000 units sold in the first two months.

Short Circuits

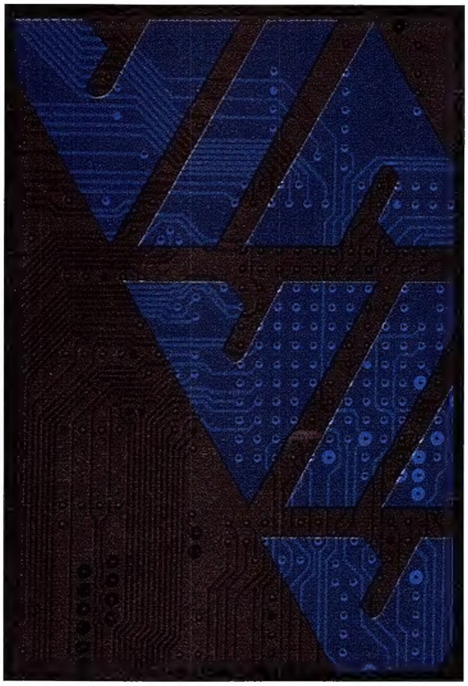
One of the more interesting things to emerge from the wonderful world of ebay has been the sale of a "PlayStation 2 Original Box And Receipt". Bidding started at $US9.99 and, 39 bids later the item was sold for $US425, with the seller kindly offering to pay for postage. The auction feedback (posted on ebay) from the buyer speaks for itself, "Complaint: Buyer Beware!!! Misleading information about item. Paid $425 for an empty box!"

In sad news for the Australian Half-Life community, the Reign Of Death online servers have closed down. Formerly the GOG servers, they have served one of the largest online communities in Australia admirably for several years, thanks largely due to the efforts of FordP and a small army of admins drawn from the Australian Half-Life clan scene.

NVIDIA has announced the release of its DirectX 8 Development Kit. The kit features what we all know as the NV20, but what NVIDIA calls its "highly programmable next generation graphics processing unit", coupled with a software developer's kit. This is designed for PC game development, but it is highly likely that the overall package is very similar to the Xbox development kits that have been distributed to game companies over recent months, however this is by no means the full power Xbox graphics engine.

Intel swallows its pride

VIA has very quietly released the first DDR RAM compatible chipset for Intel's CPUs. The Apollo Pro266 chipset supports PC1600/PC2100 DDR RAM as well as SMP (Symmetric Multiprocessing) for Intel chips on its 133MHz FSB. ATA/100 as well as 4X AGP speeds are also standard features on this chipset. It's surprising that this Intel-compatible chipset hasn't received the same amount of fanfare that the AMD DDR chipsets have, but with Intel so heavily tied to RAMBUS and its RDRAM technology it might not be too keen to see DDR RAM widely accepted. For many, the release of this board is yet another reason to believe that RDRAM may be a doomed technology, but until a P4 with DDR RAM arrives, we won't know to what extent the P4 architecture relies upon the high bandwidth of RDRAM. Rest assured though, with an Intel compatible DDR chipset on the market DDR RAM is even more likely to succeed.



On the buses

Intel and ATI have announced a broad cross-licensing agreement with each other, paving the way for integrated RADEON chipsets on Intel motherboards and (in what is becoming an all too common and disturbing trend) settling any pending litigation.

As part of the deal ATI became the first company to officially be granted a license to use the Pentium 4 bus, a surprising move considering that VIA, traditionally the first to release a third party chipset was still in negotiation with Intel. Other companies said to be interested in licensing the P4 bus include Micron, Acer and NVIDIA.

This comes at a time when NVIDIA have also decided to license AMD's replacement for the EV6 bus, the LDT (Lightning Data Transport) bus for use in a future AMD based motherboard and telegraphing a move into previously uncharted territory for the graphics card king.

This has effectively extended the ATI/NVIDIA rivalry to another front, with the companies recently extending their competition from the 3D graphics card business to motherboard chipsets with integrated graphics. This sits alongside both companies' involvement with the next generation of consoles, with ATI a major contributor to Nintendo's Gamecube and NVIDIA working on Microsoft's Xbox. It is unknown whether the motherboard chipsets will appear before these consoles are released.

Post Apocalypse

Got any comments on atomic? Any rants, raves, criticism, praise? Then let us have it. Send us your words of wisdom, of course, thanks to Microsoft our favourite letter each month will win a fantastic prize.

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Short Circuits

- **Following recent talk online about the inbuilt hard drive opening up the possibility of a mod scene developing for the Xbox, we contacted Microsoft to find out their opinion and get the official line. The response was less than encouraging for any potential Xbox modders: "At this time we do not believe that user-created mods will be supported. All software to be downloaded to the hard disk must go through a very extensive test and certification process."**

- **One of the sentimental gaming favourites, Duke Nukem 3D celebrated the fifth birthday of its shareware release on the 29th of January. Duke 3D pushed the boundaries of interactivity in first person shooters and is still receiving good community support nowadays. Duke 3D also introduced to the world the Build engine, which powered a wide range of shooters. Even though 3D Realms are much maligned over the delays of Duke Nukem Forever (which only seems like it was announced five years ago), Duke 3D stands as a landmark First Person Shooter. You can still download the shareware version of Duke 3D from www.3drealms.com/duke3d**

ⓘ Hail to the King Baby

Short Circuits

◂ In one of the more unsurprising moves of late, Quantum3D has announced that NVIDIA will be supplying them with VSA-100 chips for their Aalchemy series of workstations. In the longer term it has been announced that the two companies will work together to develop new solutions for the Visual Simulation and Training (VST), Embedded Graphics Subsystems (EGS) and Out-of-Home Entertainment (OHE) Visual Computing Systems

◂ John Carmack, one of the founders of id software, is tipped to be the next inductee into the game industry's most exclusive club, the Academy of Interactive Arts and Sciences hall of fame. This would make Carmack only the fourth inductee, joining the father of Mario and Zelda, Shigeru Miyamoto (1998), Civilization god Sid Meier (1999), and the Final Fantasy creator Hironobu Sakaguchi (2000).

◂ In a disturbing trend, paralleling the rise of online cheating in PC games over the past few years, the first online Gameshark cheats for the Dreamcast have been released. Written for use in the game Speed Devils Online, the cheats allow people to bump up their cash reserves and race points. Whilst this is still a long way from Interstate 76 style flying indestructible buses the trend is still somewhat disturbing seeing the relative ease and freedom that devices like the Gameshark give when creating cheats.

Cyrix III gets 0.15 overhaul

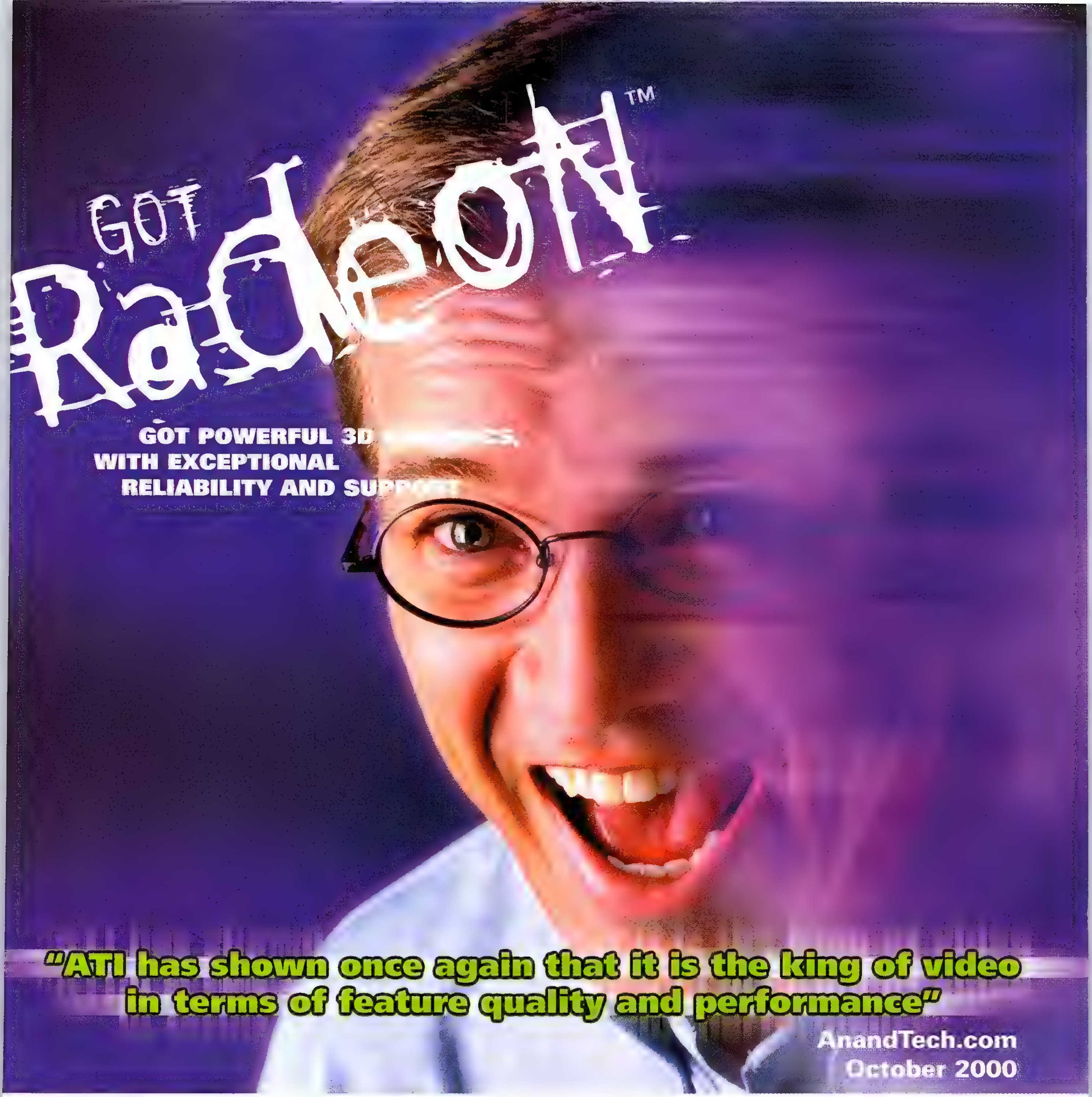
VIA's Cyrix III CPU has been given a redesigned core to help boost its somewhat sluggish performance. The new core is known as the Samuel2 and is the worlds first 0.15 micron x86 CPU. By reducing the fabrication size to 0.15 microns, the chip requires less power and gives out less heat. It is very surprising that the industry leaders Intel and AMD were both beaten to this reduction in fabrication size from the current industry standard of 0.18 microns. Cyrix was supplied with 0.13-micron wafers by TSMC (Taiwan Semiconductor Manufacturing Company), leading many to believe that the new Samuel2 core would be manufactured on a 0.13-micron fabrication but it wasn't to be. Another 64kb of L2 cache has also been added in an effort to boost the Cyrix III's woeful performance. Unfortunately the new core hasn't remedied the poor performance of the Cyrix III as initial benchmarks show it to be much slower than an equivalently clocked Celeron or Duron.

Mac finally gets some graphical grunt

On 9th January this year Macintosh users throughout the world rejoiced as one. For this was the day it was announced that the new Apple Power Mac G4's would be shipping with the NVIDIA GeForce2 MX video card on the Mac's shiny new 4X AGP slot. We are a bit perplexed as to why NVIDIA decided to release only the SDRAM-equipped budget model of the GeForce family for the Mac. NVIDIA's head honcho, CEO Jen-Hsun Huang, stated "NVIDIA and Apple have worked together to provide customers with the most advanced visual computing and multimedia experience in the world". Seems like he hasn't ever seen a 1.5GHz Pentium 4 with a GeForce2 Ultra tearing through the frames in Q3A before.

Napster to charge

The company the record companies love to hate has announced that it is soon to start charging a membership fee to users of the Napster file sharing software. Artists of the music that is swapped over the Napster network will then be paid a royalty fee from the revenue gathered. The announcement from Napster CEO Hank Barry is obviously linked to an agreement with the German media mega company Bertelsmann that was made late last year and the recent agreement reached with American independent TVT records. While talks are continuing with other media groups, Napster is still being sued by several of the major record companies in the US. Mr Barry is still hoping that these suits can be resolved without settlement, rather through a process of "constructive dialogue" and "legislation" to resolve their ongoing copyright woes.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October 2000

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Microsoft sites hacked

On the 25th of January, Microsoft became the latest company to suffer from a DDOS (Distributed Denial of Service) attack by hackers. This attack was not targeted at Microsoft's servers, but rather the hardware switches that Microsoft use as routers. Microsoft believes the attack may have resulted from a DNS failure that it suffered the week before, exposing a weakness in the Microsoft network. As a result of the attacks, Microsoft has hired Akamai to help combat the threat of DDOS attacks. Akamai's content delivery network was originally intended to speed up downloading from Web sites by moving as much content as possible closer to the individual Web servers, and then distributing thousands of these servers throughout ISPs and hosting centres. This makes DDOS attacks much less effective as the hackers need to flood many more entrances to the sites. Microsoft's work with Akamai might see it becoming the standard for Web site hosting and security.

Athlon 'Samson' Supercomputer

AMD's march into the high end sector continues with the creation of a new high- speed computer at the University of Delaware in the US. This behemoth contains 128 1GHz Athlons running in a Beowulf Cluster design. Dubbed Samson, it is expected to rate within the top 200 supercomputers in the world upon its initial release, and with the development of updated Linux compilers its performance should rise even further. This parallel processing machine was constructed by RackSaver, with special care taken to disperse the huge amounts of heat that 128 Athlons produce. Interconnect's Scaleable Coherent Interface has been used to supply 1GB of bandwidth between the different nodes of the machine.

What's HOT	What's NOT
Operation Flashpoint The screenshots of this upcoming game have made us forget all about TF2	**Counterstrike** Fast running invisible server crashers ruining the game
Fast drinks (Jolt, Coke) The new gamers choice.	**Smart drinks** Too much herbal crap, we just want caffeine
Archimedes Principle Buckets of fun.	**Thermodynamics** Heat sucks
GeForce2 MX The budget card solution with good performance at low resolutions	**GeForce2 Ultra** The way of the future, high speed, high cost
Sega Spreading the goodness to the other platforms.	**Microsoft** Halo Xbox, goodbye PC
IRC #atomicmpc on Austnet, unofficial but fun	**ICQ** 300 "close personal friends" is pushing it

Short Circuits

◂ If you are holding your breath for the release of HALO on the PC, you might want to take a deep gulp of air right now. Bungie have announced that HALO is currently being worked on for Microsoft's upcoming Xbox , and is likely to ship as a launch title. Whilst development has now stopped for the PC, Bungie does still plan to release for the PC/MAC formats. To answer the question we know you are going to ask, straight from the horses' mouths in the Microsoft stables: "Work on the other versions will start when this one is finished"

Issue 1 Corrections

◂ Socket A HSF roundup: The version of Motherboard Monitor we used was later found to display CPU temperatures around 10C lower than the BIOS reported. This was constant for all tests in our overclocking feature.

◂ Creative Blaster PC 3DMark2000 Pro results:
1024 x 768 at 16bit = 6,630
1024 x 768 at 32bit = 5,853
1280 x 1024 at 16bit = 6,015
1280 x 1024 at 32bit = 4,508
1600 x 1200 at 16bit = 4,965
1600 x 1200 at 32bit = 3,184

◂ P4 vs Athlon - Sandra Memory Benchmark: figures for P4 should read:
ALU/Memory Bandwidth = 1,418MB/s
FPU/Memory Bandwidth = 1,465MB/s

◂ AMD overclocking tutorial: Duron 700 at 950MHz ran at 1.8V, not 1.85V

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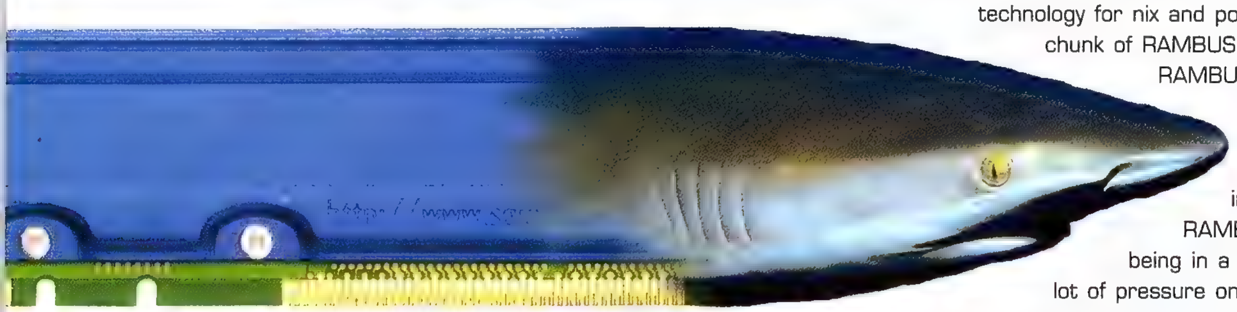
RAMBUS Wars: The saga continues

Simon Peppercorn braves a lawsuit in the pursuit of news

In February 2001, probably around the time you're reading this, RAMBUS, who are shaping themselves as the dark lord of the hardware industry, head off to court in Germany, for two different trials.

Both Micron and Hyundai are involved in separate legal disputes with RAMBUS concerning the use of the RAMBUS patented SDRAM and DDR SDRAM. Infineon have also been sued and plan to fight RAMBUS all the way, with a court date set down for May 2001.

RAMBUS is taking action against Micron Technology (a semi-conductor manufacturer) with claims by RAMBUS that Micron is infringing a European patent for technology. Micron uses the basis of this technology in the United States to manufacture SDRAM and DDR SDRAM. However, Micron is suing RAMBUS, claiming RAMBUS violated antitrust laws. Micron further argues that the technology itself is unpatentable and the licences are unenforceable.



RAM this up ya BUS!

RAMBUS also sued Hitachi, but to the horror of others in the industry, Hitachi settled, under confidential terms. Toshiba cut a deal with RAMBUS. This was not a sign of weakness but was more to do with Toshiba exclusively manufacturing RDRAM for the PlayStation 2. Obviously Toshiba needed to stay on good terms with RAMBUS.

Patently obvious

RAMBUS has almost 100 patents over the technology behind SDRAM and DDR SDRAM, as well as RAMBUS-owned RDRAM. They are levering themselves into the market by force, attempting to profit from the development and manufacturing of almost every memory related product. Their strategy is to extract royalties from anyone who wants to manufacture synchronous dynamic random access memory (SDRAM) and double data rate SDRAM (DDR SDRAM) by waving in their face patents for a technology that is over ten years old.

Their marketing strategies have done little except earn the scorn and contempt of most others in the industry. On top of this, they have partnered up with Intel in a move to attempt to force vendors to use RDRAM.

There were industry concerns that all producers of memory would all soon fall at the feet of RAMBUS and submit to its strong-arm tactics. In this instance however the strong arm may well belong to Intel.

Here's where it gets well interesting. According to sources, Intel don't pay RAMBUS a cent for the technology, yet are perhaps the biggest users of RAMBUS products. Now you have to wonder, if RAMBUS are so money-hungry, why don't they take the opportunity to milk one of the largest vendors of motherboards and chipsets for all they can?

Rumours circulated that Intel and RAMBUS conceived a "partnership" of sorts, where Intel gets the RAMBUS technology for nix and pockets a large chunk of RAMBUS stocks. In return, RAMBUS gets the staunch support of one of the strongest powers in the industry. RAMBUS fancy Intel as being in a position to put a lot of pressure on manufacturers to use (and therefore licence) RAMBUS owned RDRAM. Naturally, the more manufacturers who use RDRAM the more the value of Intel's stock in RAMBUS rises. The money RAMBUS don't make directly from Intel, they suck from the rest of the industry.

Chip manufacturers are suffering as memory prices have fallen but they're still being forced to pay royalties to RAMBUS.

Meanwhile AMD giggle quietly to themselves as Intel are starting to look somewhat silly for investing so heavily in RDRAM, a technology that the rest of the manufactures don't want to know about and the buyers don't want to pay for. The product is still substantially higher in price than standard SDRAM, and most benchmarks (not including those spruiked by Intel and RAMBUS) demonstrate a somewhat flaky performance.

It would appear that Intel does not want to share in the level of distrust and animosity aimed at RAMBUS and recently seems to be slowly backing away, a bit like you do when you see a brown snake in the grass. The rebellion has started as the industry turns on RAMBUS... we pray for a new hope.

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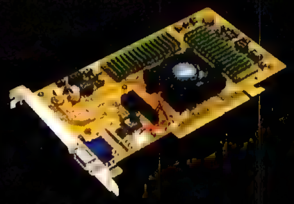

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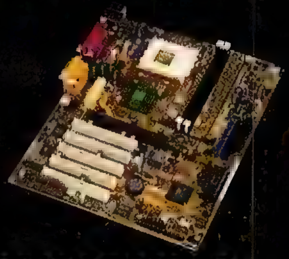

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Tile-based rendering

Conventional 3D rendering techniques date all the way back to the 1960s and were developed for use in CAD (Computer Aided Design), engineering and movie special effects, which were all burgeoning applications of this funky new 'computer' technology. Since then, not a lot has changed in terms of the theory, although the application has gone through multiple generations resulting in the latest GeForce and Radeon chipsets that we all know and love today.

"it is not unusual for each pixel to be drawn and redrawn three or four times – which basically wastes 2/3 to 3/4 of your texture memory"

Basically the root of every 3D scene is polygons, which are generally made up of triangles. A conventional 3D graphics chip will compute the locations of all the polygons in a scene, in the order they are sent to the hardware (called 'immediate mode'), and then 'transform' the 3D scene into a 2D image based on a particular perspective. At this point textures are applied to the polygons, as well as effects like shading. The graphics chip then analyses the depth of each pixel on the screen using the z-buffer (the memory buffer that contains all the information pertaining to the z-axis of each pixel), and determines which pixels are in front of which. If pixel 'A' is found to be behind another pixel 'B', and pixel 'B' is not transparent, such as if it is a wall, then pixel 'A' is simply discarded and doesn't get rendered to the frame buffer. If pixel 'B' is transparent or semi-transparent, such as if it is a dark glass window, then the two pixels are blended together. Once all the pixels in the transformed scene are accounted for, then the whole lot gets rendered to the frame buffer, which then gets sent to your monitor.

This is a fairly straight forward method, and one that has been pushed to astounding speeds using special techniques like the hardware transform and lighting engines in the GeForce and Radeon as well as things like multi-texturing and multiple rendering pipelines. Unfortunately, the conventional method of 3D rendering is just not very efficient in terms of memory usage. This is because all the pixels in a scene get textured before they are checked for depth. This results in many pixels that have already been rendered simply being discarded. This phenomenon is called 'overdraw' and it is not unusual for each pixel to be drawn and redrawn three or four times – which basically wastes 2/3 to 3/4 of your texture memory at this stage in the rendering processes. With 3D scenes getting more complex all the time, and with resolutions getting up to the 1,600 x 1,200 mark, with 32-bit colour and high resolution textures becoming more common, memory bandwidth is really at a premium these days – hence the increasing use of expensive DDR RAM.

Stick that up your z-buffer

Thankfully, there is an alternative – and this comes in the form of 'tile-based rendering' from PowerVR Technologies. PowerVR has been working on this radical new method for some time now, which has culminated in the third generation of PowerVR graphics chip, the KYRO. Tile-based rendering reorders some of the main steps in the rendering pipeline in order to conserve on memory bandwidth by doing away with the wasteful overdraw inherent in conventional 3D graphics chipsets.

First of all the PowerVR doesn't deal with the polygons in immediate mode, but uses a 'display list' to break the scene up into small units called 'tiles'. Each tile is then worked upon using a special internal z-buffer to determine which polygons are in front of which, and saving on memory bandwidth by not having to access external RAM – and all this is done before any texturing takes place. This is what PowerVR calls 'deferred texturing'. Only after all the hidden surfaces are removed are the textures laid over the polygons and the whole lot is rendered and sent to the frame buffer to be displayed on screen.

This technique effectively saves on the inefficient overdraw problem of conventional 3D graphics chips, and thus can deliver similar levels of performance to conventional chips while using a lot less graphics RAM. Memory is still needed for storing textures and for the frame buffer, especially if you are outputting at 32-bit colour, but the bandwidth requirements of the KYRO are far less than that of the GeForce. ATI's Radeon comes somewhere in between these two chips by using a method of HSR (Hidden Surface Removal) called 'HyperZ', which is similar in principle to tile-based rendering, although it essentially consists of a few 'tricks' to speed up the z-buffer access in the rendering processes.

Given the fact that DDR RAM is very expensive to produce, and is already starting to bottleneck performance in cards like the GeForce2, it is likely that tile-based rendering, in some manifestation or another, will become more popular over time. At the moment, the KYRO represents a solid low-cost alternative to the GeForce2-range, and is one of the only cards comparable to the GeForce2 MX in performance and price.

www.powervr.com

'Your move punk . . .'

'We have a vision: NO MORE cocky, bragging, selfish, immature Cheaters flaunting their ability to "get away with it" in the Online Multiplayer world.' Hear hear! This is a quote from the into page of PunkBuster, a site dedicated to eliminating cheating in games such as TFC and Counter-strike. We think it is a pretty fair to say that one of the lowest possible creatures in the universe in terms of skill, integrity and general value as a human being is someone who believes they are justified in using hacks and cheats, or exploiting bugs, in order to gain an advantage over other 'fair' players.

PunkBuster uses special client/server software that is able to identify individuals who are using any known cheats on their system, such as wall hacks, skin cheats, spiked models, speed cheats, and shot scripts. The server can then take a wide range of actions depending on its configuration, from sending a message to everyone on the server, announcing who is cheating, and what cheat they are using, or it can simply create a log file that enables the server admin to ban that user's WON ID from the server – meaning they can never connect to that server again. There is also a clan tag registry, meaning, for example, the tag [TC] can only be used by Australian Counter-strike clan, Total Consciousness.

PunkBuster is still in development, and has not left the beta stage as this goes to print. It seems to be a useful method of catching cheats, although it might end up being most effective when used as a deterrent. It is not infallible, however, and there are already long strings on message boards of CS clans claiming an individual was caught cheating by PunkBuster, while that individual vehemently denies ever using any cheats on their system. If something like PunkBuster ever does make a mistake, either through a problem with the programming, or through user error, it has the potential to utterly ruin an individual's reputation in the online community – and this is not a matter to be taken lightly.

Ultimately the whole issue of cheating online is an unfortunate by-product of human nature, where unscrupulous individuals, with little or no moral fibre, are ruining the game for everyone, and even impacting the sales of games. It is disappointing that something like PunkBuster even needs to exist in the first place, although while cheating continues, it is nice to know that there are some people out there who will continue to campaign for fair play for everyone.

www.punkbuster.com

Short Circuits

Soars the Falcon

After two years, MicroProse's controversial Falcon 4.0 is finally beginning to reach its potential as being the best modern-day flight sim ever thanks to the efforts of all those involved in the Falcon 4 Realism Patch.

Besides performance and stability tweaks, the Realism Patch also enables a lot of latent features in Falcon 4, such as the ability to fly the campaign from any side, in any plane, from a plucky F-5E or the ugly A-10 Warthog, to the mighty Su-27. It also increases the amount of flak flying around, giving the sim a spectacular and hair raising feel when flying below 10,000 feet. If you liked Falcon 4, but like many fans, you gave up after dealing with innumerable bugs and crashes, then you must give the Realism Patch a go – it makes Falcon 4 amazingly fun again.

http://rpg.falcon40.com

Short Circuits

Newton Wars

At long last, the sequel to the highly-acclaimed, although under-appreciated, Independence War, is on its way, called: Independence War 2 – Edge of Chaos. One of the most striking features of the I-War series is its use of a detailed and highly realistic physics model. Anyone who knows a little about space can see the absurdity of having an arbitrary speed limit set on space craft, as is the case in games like the X-Wing and Wing Commander series.

In the I-War universe, you actually have to deal with Newton. Sure, you can go as fast as you want if you just keep accelerating in one direction, but if you want to turn around, then you have to apply just as much thrust in the opposite direction. There is a simple mode of flight that does automatic adjustments for you, making the craft feel more like the arcade space sims, but these controls can be overridden if necessary, allowing you to perform some funky manoeuvres, like sliding sideways while shooting forward, or turning 180° and shooting directly behind you. Mmmmm....physics.....

http://www.independence-war2.com/

GameCube goes for 1T-SRAM

So – what the hell is the cryptically-named 1T-SRAM? It is a new memory technology developed by MoSys, which old-school readers might remember used to make some speedy graphics memory back in the days of the funky Tseng Labs ET6000, with its MDRAM (Multi-bank DRAM). 1T-SRAM is a new type of SRAM (Static Random Access Memory) that is engineered for performance and low cost of manufacture. It uses a single-transistor cell design to enable higher density on-chip compared to conventional six-transistor SRAM. This higher density allows up to 4Mbits to be packed into only 4.5mm^2 of silicon at a 0.18-micron process. Such high density also lowers manufacturing costs by increasing yields. It also results in lower power consumption, which can be as little as a quarter of the normal power used by conventional SRAM. At a 0.18-micron process, 1T-SRAM will be available at speeds of up to 400MHz.

> "... higher density allows up to 4Mbits to be packed into only 4.5mm^2 of silicon."

Given these features, it is no great surprise that Nintendo has chosen to use 1T-SRAM in its GameCube console. The GameCube will be packing 24MB of '10ns or lower' 1T-SRAM as its main system memory, along with 16MB of 100MHz DRAM, as well as 2MB of 5ns 1T-SRAM as a frame buffer and another 1MB of 5ns 1T-SRAM as a texture cache, with the last two being embedded directly into the graphics controller, Flipper. This gives the GameCube some impressive memory bandwidth specs of 3.2GB/sec for the main memory, and a speedy 12.8GB/sec for the texture memory.

What does this mean for poor old SDRAM? It seems as though the only next-generation console using SDRAM is the Xbox, with its high-spec Micron 200MHz DDR (equivalent to 400MHz) RAM.

www.mosys.com

Racing RAS

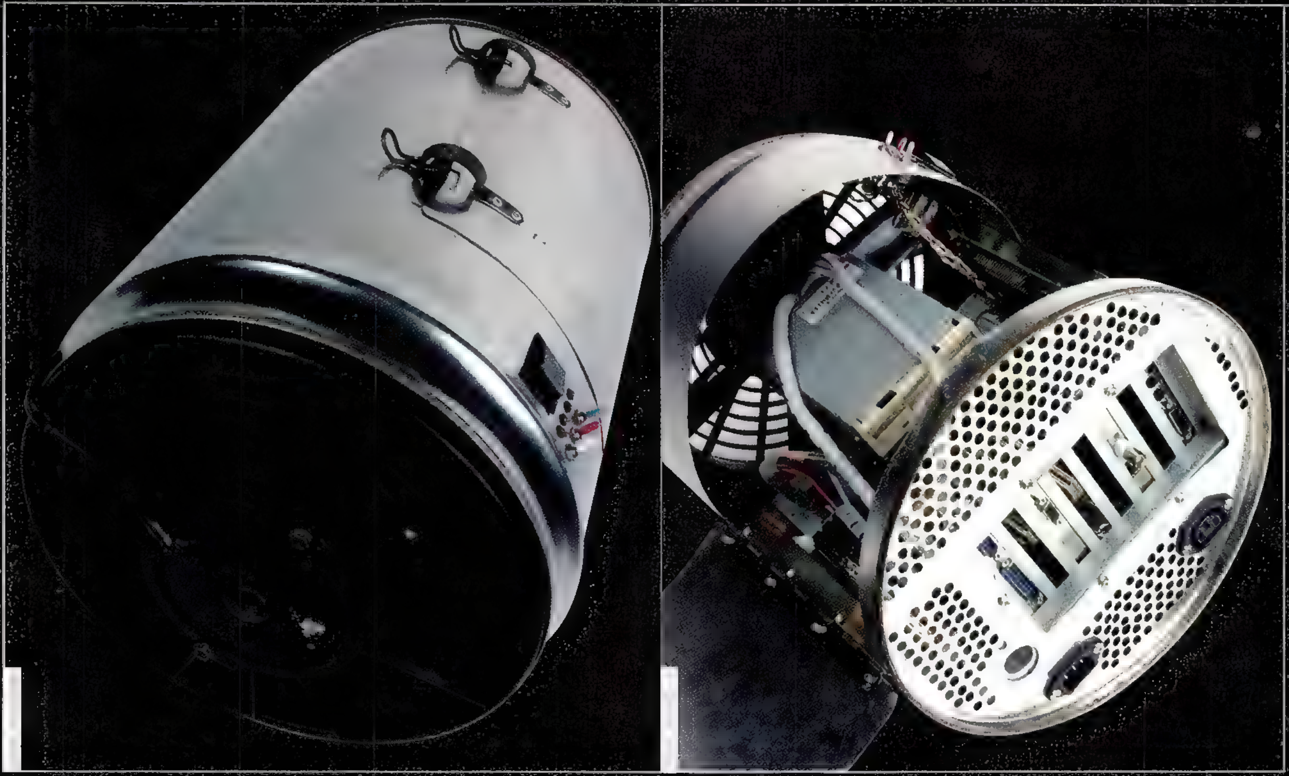
One easy way to push a few more fps out of your system is to make sure that your RAM is running at optimal levels. Most RAM has a ns (nanosecond) rating on it somewhere, and this directly corresponds to the frequency at which it can run. For example, PC100 SDRAM is rated at 10ns, and PC133 is rated at 7.5ns, although often you will find your RAM will be rated higher than its default standard. If you have some PC133 that is rated at 7ns, then you should have no problem running it at 143MHz. Unfortunately, often the only way to run your RAM at non-standard frequencies is to push your front-side bus (FSB) speed over default settings, and this can have ramifications on your other peripherals like AGP or PCI cards or IDE controller. Newer motherboards based on the i815 and VIA Apollo Pro 133A chipsets will also allow you run your CPU with a 100MHz FSB while your RAM can be running at 133MHz.

Another easy way to push your RAM is to make sure that your RAS and CAS settings are optimised. SDRAM is broken up into rows and columns when it is accessed by the CPU, and the RAS and CAS stand for Row Address Select and Column Address Select. There are usually a few options in your BIOS relating to your RAS and CAS settings, such as 'CAS latency', 'RAS-to-CAS delay' and 'RAS precharge time'. Usually your RAM will have its RAS and CAS settings labelled on your RAM in the format of CAS latency, RAS-to-CAS latency and RAS latency.

These figures represent the latencies in number of clock cycles. The first thing to do is make sure your RAS and CAS settings in your BIOS correspond to your RAM's values, and you can even try pushing the BIOS settings above the defaults to get a bit of extra performance. Changing one or more of the values from '3' to '2' can often increase performance, especially in memory-intensive games like Quake 3: Arena, although you might experience instabilities. If so, simply drop them back down to their defaults.

Turbine PC

Mad Max meets Pod Racing meets Keith's garage toolkit. Go Keith!



technical details

IN THE BOX:
133MHz K6, 32MB RAM, 264MB HDD, 2MB PCI graphics, Linux. OS (Redhat 6.2)

SPECIAL FEATURES:
12v 80w car radiator fan fitted perfectly to an old tin can found behind a wreckers yard.
All other components were scavenged from old gear. The only components Keith had to purchase were 4 x 3mm LEDs, 3 x switches and a piano hinge for the lid. Total cost $20.

CONSTRUCTION:
Keith wanted to use an old beer keg, but backed down when he discovered they were made of stainless steel and would have shredded his tools. Using thinner tin meant Keith had to excersise great care when drilling, so as not to rip the tin.

Got a box that's hot? Email us a low-res pic and tell us what's special. If we like what we see we'll be in touch to arrange a photoshoot. A free 12 month subscription for winners. hotbox@atomicmpc.com.au

Keith McGaughran is a very special kind of freak. His Turbine PC is unique, a bit rough around the edges and hell-loud. When Keith brought his beast into atomic HQ we sat it on a desk and fired it up. Everything in the path of the fan's out-port was blown over -- blinds on the window 10 metres away were blown vertical. Seriously. Staff from several offices away came running, thinking we'd somehow parked a Learjet inside and several carefully cultivated hairstyles were ruined forever. Way cool, Keith. This project was about form, not function. Ignore the 133MHz AMD, instead marvel at the 12v 80w car radiator fan and jet-like case.

> I know the hardware is old crap but it was free. It was all found in rubbish piles that people were throwing out.

We were very interested to see if the torque generated by the massive fan motor would cause the case to roll, but Keith had forseen this possibility and had deliberately put all the components – especially the two heavy PSUs (one dedicated to powering the fan), at the bottom of the case to create a low center of gravity.

The Turbine is an ongoing project. Keith is looking to replace the guts with an Abit KT7 mobo running a Duron 700.

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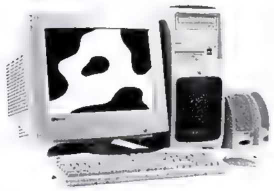

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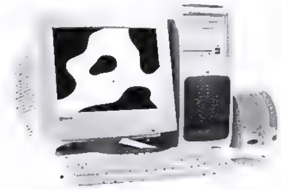

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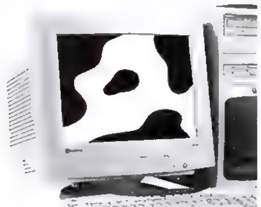

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PELTIERS

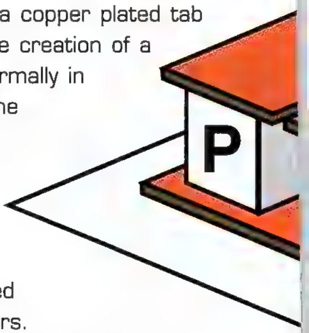
(Thermoelectric Coolers)

Simon Peppercorn examines these magic cooling tiles that are hot on one side, cold on the other

A TEC (Thermoelectric Cooler), also known as a "Peltier" is essentially a solid-state heat pump. It works using the "Peltier Effect" (named after its discoverer, J.C.A Peltier), which is based on a theory that when you pass an electric current through two conductors a heating or cooling effect can be achieved.

When I say cooling, I mean seriously cold. Within seconds of powering the device, you can see ice crystals actually form on the surface.

Typical Peltiers are constructed from two thin ceramic wafers. Between these layers sits a series of P and N doped bismuth-telluride semiconductor material. The P type is deficient in electrons, and the N type has excess of electrons. By combining a P and an N, a thermoelectric couple is created. The couples are connected electrically, in series, with a copper plated tab junction. This allows for the creation of a series circuit, which is thermally in parallel, and keeps all of the generated heat constantly moving in the same direction.



As a current is passed through the Peltier, electrons are moved between the semiconductors. When the electrons pass from the P to the N material they jump to a higher energy state and absorb thermal energy. This means that side of the device becomes very cold. As the electrons pass through the lattice of couples they move back to a P type semiconductor and drop to a lower energy state, releasing that energy as heat. So this side of the device becomes very hot. Reverse the current and the electrons and the generated heat move in the opposite direction, the cold side becomes hot and the hot side becomes cold.

The heat, which is absorbed at the cold junction, is pumped to the hot junction at a rate that is proportional to the number of couples and the current that is being applied. The hot side must be attached to an appropriately sized heat

> **"Within seconds of powering the device, you can see ice crystals actually form..."**

DANGER! DANGER!

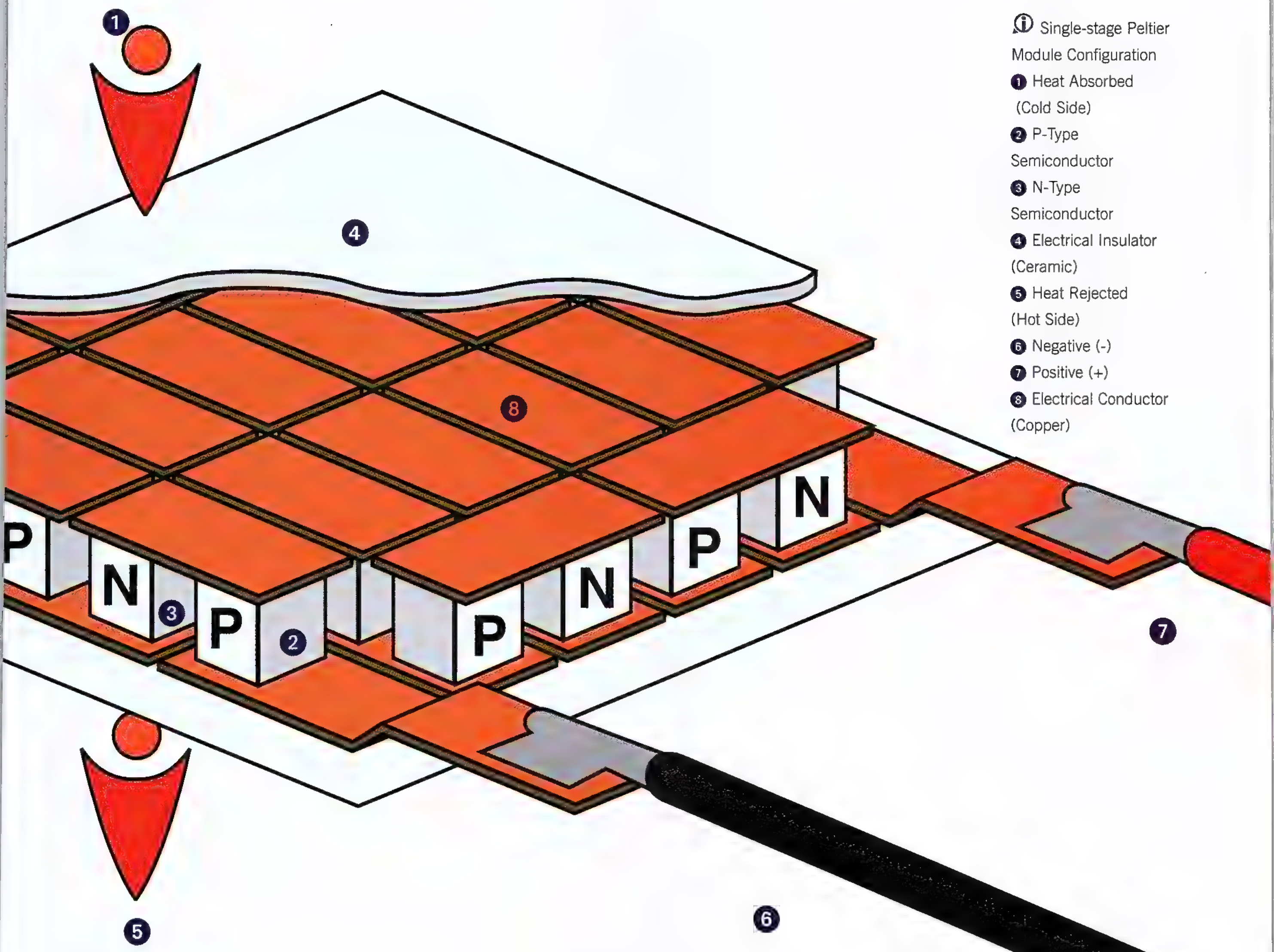
There are pitfalls involved when using Peltiers, including:

- **Overheating:** I've explained how important your heat sink is in moving heat away from the device to keep it cool, and a decent heat sink will do the job nicely. BUT, (there it is again!) the fan on your heat sink will probably fail one day. When this happens, you'll have just a few seconds to say goodbye to your CPU.

- **Power Problems:** Your system may not be capable of providing the amount of power that a Peltier draws. So you may need to upgrade your power supply.

- **Water/Condensation:** Ice can form on the Peltier. What happens when ice melts? Also, condensation can form on the surface of the CPU and around the socket. Even though condensation isn't usually conductive, as it contains almost no ions, you don't want it sitting around on your electrical components.

- **Jealousy/Humiliation:** If you get your Peltier working successfully your mates will probably despise you. However, this is not as nowhere near as bad as having to cope with the humiliating experience of having them laugh at you if you mess it up and fry your CPU.



Single-stage Peltier Module Configuration

① Heat Absorbed (Cold Side)

② P-Type Semiconductor

③ N-Type Semiconductor

④ Electrical Insulator (Ceramic)

⑤ Heat Rejected (Hot Side)

⑥ Negative (-)

⑦ Positive (+)

⑧ Electrical Conductor (Copper)

sink and fan. In fact, a decent heat sink and fan is absolutely critical if you want to use a Peltier successfully. If the heat sink is not effectively transferring heat away from the device then the cold side of the Peltier will start to warm up, often with disastrous consequences

You may have worked out by this that a Peltier is bound by the laws of thermodynamics and therefore does not actually destroy heat; it only moves it from one place to another. We must not forget a basic fact that coldness is simply the absence of heat.

That said, here's a simple rule of thumb... the bigger the Peltier the more it cools. BUT, (there's always a BUT) the bigger the Peltier the higher the current you need to apply. This means that more heat is moved to the heat sink and the ambient temperature increases. That has the effect of a higher heat load on the Peltier, the device loses its efficiency, and your heat sink can't take the load. Can you see where this is going?

If you were starting to think at this point that a Peltier could destroy your CPU — then you'd be right. If you choose the wrong one, or don't install it correctly then you will probably put an end to your CPU and possibly your motherboard as well.

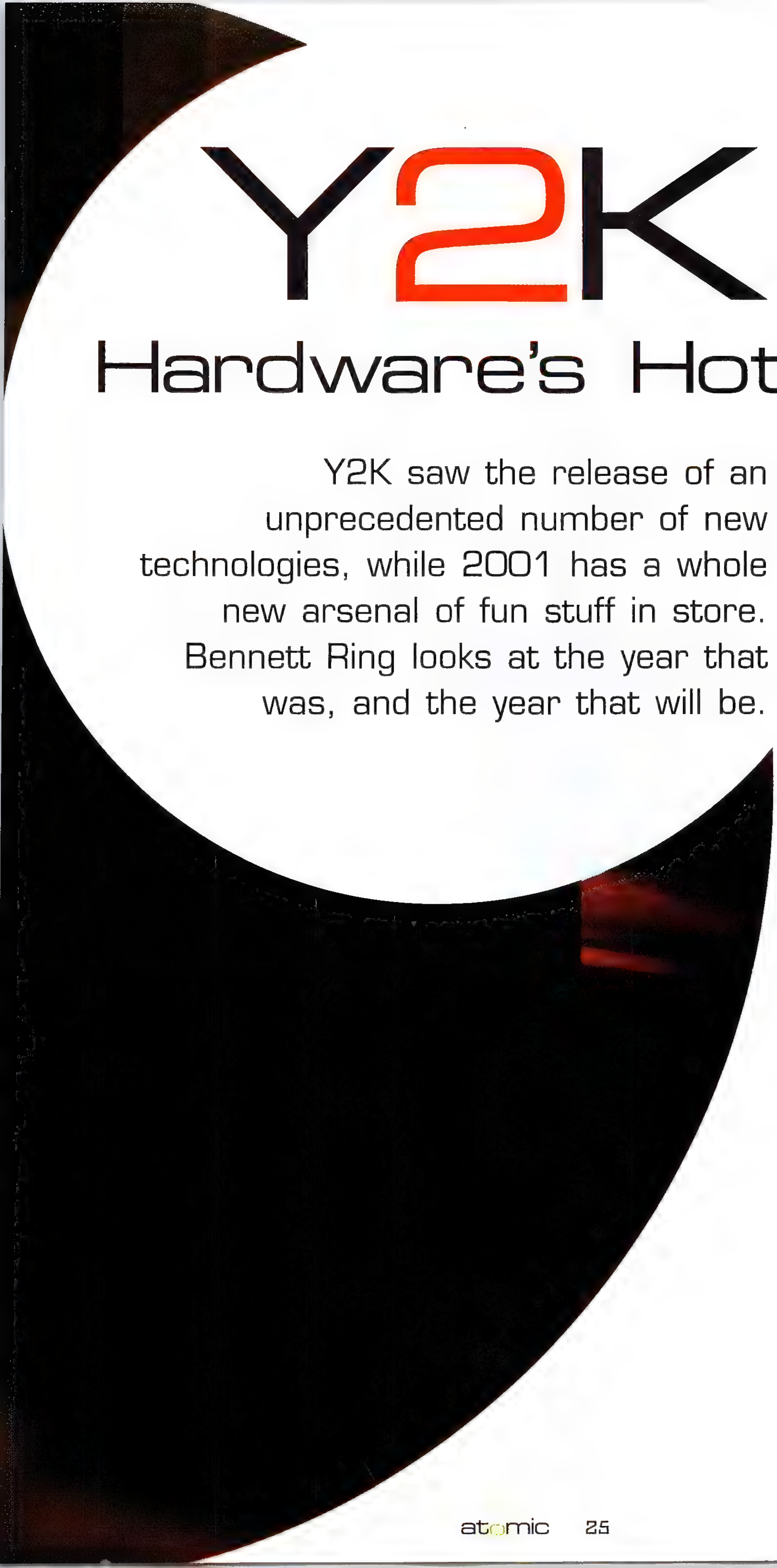
Using some reasonably complex mathematical equations, it is possible to accurately determine which Peltier is most suited to your needs.

There is no need to reach for your scientific calculators just yet. In our next issue, we will try and make the process less bogged down in theory.

So...

The usage of these devices to cool CPUs is becoming more widespread. The next issue of atomic will go into further detail and show you how to select and install one, and show you how to overcome some of the problems you may encounter.

y2k



Y2K

Hardware's Hot Year

Y2K saw the release of an unprecedented number of new technologies, while 2001 has a whole new arsenal of fun stuff in store. Bennett Ring looks at the year that was, and the year that will be.

As we entered the year 2000, the end of the world was nigh and it was all those damned computers' fault. Thankfully the trillions of dollars spent worldwide fixing the Y2K problem meant that we would all have to baffle our way through another year of product releases and the inevitable upgrades we have all grown to both love and hate.

This article will look at the hardware developments of last year, excluding video card technology that is covered in our video card article on page 66.

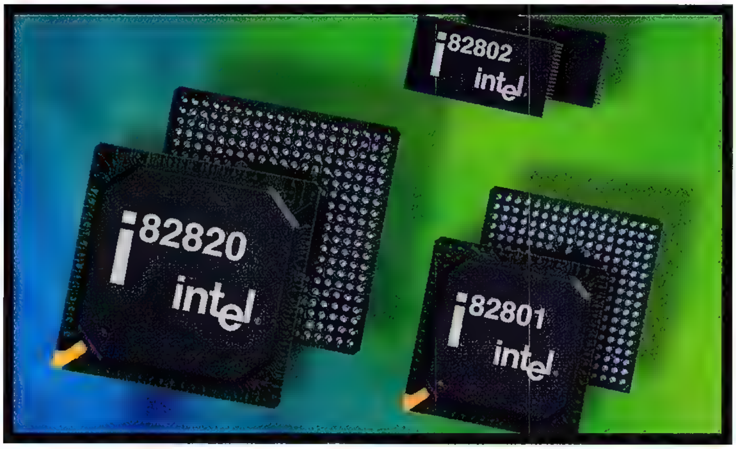
Intel dominates

Going into 2000, Intel was in its familiar position of total market dominance, with its Coppermine PIII having wrenched the performance crown from the AMD Athlon. Due to this, Intel also controlled the chipset sector with its long-legged BX chipset. Although the BX only officially supported a 100MHz FSB (Front Side Bus) and was two years old, it had matured to the point where even 133MHz FSB speeds were stable.

Intel did have an official chipset for release as a home for the new 133MHz FSB Coppermines >

– the i820. This initially only supported RDRAM upon its release, but the performance increases from the new memory technology proved negligible. When RDRAM's high price was factored into the equation it became clear RDRAM would struggle to gain a foothold in the price-competitive memory market.

AMD's Athlon was struggling under the pressure of the Coppermine PIII, due to its off-die L2 cache and scarce motherboard support. By having the L2 cache mounted externally to the core, its maximum cache speed was always limited to a maximum of 333MHz (pushed to 340MHz in the Athlon/850MHz). This limited the processor as it was ramped up in speed and stopped the Athlon from being equal to the PIII in terms of performance. Fortunately for AMD, most buyers only cared about the MHz rating of the chip and didn't understand the cache difference.



The i815 chipset finally provided the Coppermine with a suitable home

"Fortunately for AMD, the majority of buyers only cared about the MHz rating of the chip..."

The Athlon finds a home

The motherboard manufacturers slowly began to promote their Athlon solutions in Q1 of 2000. Both VIA and AMD had chipset solutions for the Athlon, although AMD was keen to stay away from the chipset market and only released its 750 chipset to ensure the Athlon had a platform at launch. This left VIA as the Athlon's saviour when they began volume shipping of its Athlon compatible Apollo KX133 chipset.

VIA also released the Apollo Pro chipset for Intel, but stability and performance issues held the chipset back, leaving Intel still looking for a suitable official chipset for its Coppermine CPUs.

By February the Athlon's tolerance to multiplier overclocking through the use of a GoldFinger device had become widely acknowledged, boosting the Athlon's popularity in the overclocking and tweaking sector. These devices were attached to the Slot A Athlons and allowed multiplier adjustments for overclocking.

Dreamcast goes online

Around the same time, the console market in Australia finally entered the Internet age in a big way. Sega's Dreamcast hooked up with Telstra's Big Pond ISP to provide the Dreamcast console with 56K Internet access, via the Dreamkey. Unfortunately there was a severe lack of games on the Dreamcast that took advantage of its new online capability.

Just after the Dreamcast went online, Microsoft announced that it was going to enter the gaming console market with the Xbox. The specifications blew all of the competition out of the water, resembling a PC more than any previous console. The fancy chrome X-shaped mock up got the saliva glands of tech geeks world wide pumping, but unfortunately this design was not kept for the final release version.

At the start of the year the Ultra ATA/66 interface had become standard for most hard drives in PCs. Most of these had a rotational speed of 5,400rpm, although 7,200rpm drives were starting to become more commonplace. Seagate decided to up the ante in February with its Cheetah X15 hard drive. This phenomenally fast hard drive spun at the amazing rate of 15,000rpm, and lowered the seek time to 3.9ms - half the time of its competitors.

The GHz barrier is broken

The mighty Gigahertz barrier was broken in March and surprisingly AMD were the first to reach this speed. Its 1GHz Athlon was released mere days before the PIII 1GHz, and even though it was still hindered by an off-die L2 cache, the fact that AMD had beaten Intel to the 1GHz mark sent a clear signal that it was now a force to be reckoned with. While AMD had a relative abundance of 1GHz Athlons to send to distributors, Intel was having major problems getting its 1GHz CPUs out to its distribution network, suggesting that Intel's 1GHz CPU had been rushed to save face.

April saw the demise of the creators of A3D: Aureal. Creative's only major rival had earlier decided to manufacture its own sound cards instead of licensing its A3D chipset to other manufacturers. This decision led to even greater losses for the company, something 3dfx should have taken note of. Aureal's assets were soon snapped up by Creative, which in turn churned out myriad versions of its Live! Cards, all still based upon the ageing but effective EMU-10K1 chip.

With the failure of the market to adopt the i820 motherboards utilising expensive RDRAM, Intel released a version of the i820 that supported SDRAM in May. This chipset made use of a MTH (Memory Translator Hub) to speak with the natively RDRAM-based chipset, but it was soon found to be faulty resulting in a product recall of all i820 MTH boards - yet another embarrassment for Intel that proved to be the final nail in the i820's expensive coffin.

AMD plays catch up

June 2000 saw the release of the new Thunderbird core Athlon CPU. This rectified the Athlon's cache woes, incorporating 256Kb of on-die L2 cache, enabling the Athlon to perform on a level playing field with similarly clocked PIII CPUs. AMD also began promoting the Socket A format, as opposed to the original Slot A design.

An unforeseen result of this move to Socket A saw many people try to fit Intel FCPGA heatsinks onto the Socket A Thunderbirds, resulting in cases of the core being damaged. The new Athlons didn't require quite as much power to run as the original Athlons, making them stable on 250W power supply units, as opposed to the 300W PSU necessary for the older Slot A Athlons.

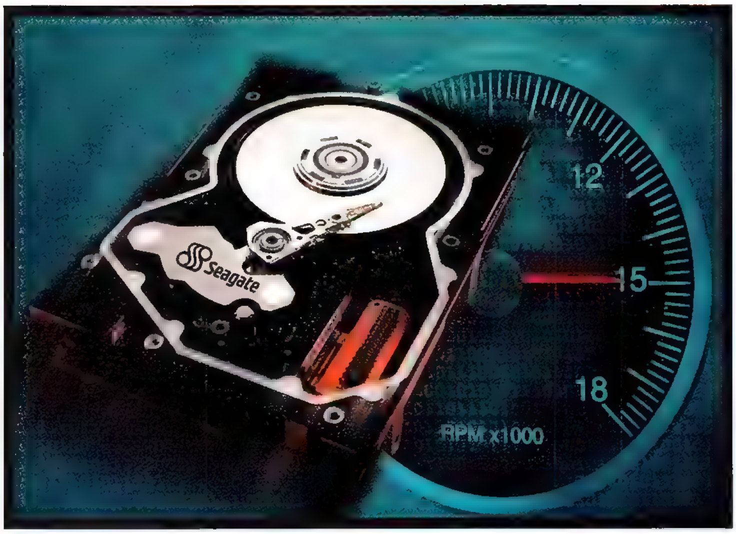
June also saw the release of the i815 chipset. Finally the Coppermine had a motherboard with official 133MHz FSB support that performed both quickly and reliably, and supported vanilla SDRAM. Unfortunately the Coppermine PIIIs were still far more expensive than similarly clocked Athlons.

Seagate released the world's first Ultra ATA/100 hard drive in June with the Barracuda ATA II. With Promise Ultra ATA/100 controllers starting to become more common, the Ultra ATA/100 standard slowly started to replace Ultra ATA/66 as the standard for PC hard drives.

Debut of the Duron

The Duron 600MHz amazed the world with its high performance at a low price in June. Unfortunately, being targeted at the budget market meant that it would also need a low price motherboard with integrated sound and video to heavily penetrate this sector, something it didn't have. On the other hand, Intel had its cheap Celeron CPUs that, whilst not as fast as the Duron, did have a cheap integrated motherboard solution in the i810 chipset.

It was around the time of the Duron launch that Socket A motherboards with built-in multiplier adjustments became available, the first of these being ASUS's A7V. When this was combined with a Duron it proved to be a potent mix.



ⓘ The Cheetah X15 raised the bar for hard drive performance

Another Intel recall

July turned out to a humiliating month for Intel, with the release of the 1.13GHz PIII. Within days of the first reviews it became apparent that the 1.13GHz CPU was not ready for release due to instability issues, and Intel had to make its second product recall for the year. On the same day of the recall, AMD released its 1.1GHz Athlon, rubbing further salt into Intel's wounds.

> **"The Duron 600MHz amazed the world with its high performance at a low price in June."**

By July of 2000 VIA had released the KT133 Socket A chipset, providing a more mature chipset for Socket A motherboards. This supported asynchronous memory/FSB speeds, allowing the memory to be run at 133MHz whilst the FSB stayed at 100MHz. VIA also came through for Intel during this month, with VIA Apollo Pro boards that supported SMP (Symmetric Multi Processing).

June of 2000 was the month that VIA released the Cyrix III. This was based upon the Samuel core created by Centaur. Whilst being extremely cheap and clocked at respectable speeds of 500MHz and above, the CPU was held back in the performance stakes by its weak floating point unit and total lack of an L2 cache.

Enter the PS2

Sony's PS2 hit Australian shelves in November of 2000. This powerful piece of gaming hardware arrived with more of a whimper than a bang, since its launch software line up turned out to be rather weak. The initial price of over $700 also deterred many people, although the included DVD functionality of the console did help to offset this.

≥

Around the same time as the PS2 launch, Telstra finally released its ADSL service to consumers. Due to the very patchy coverage of cable internet access, ADSL was in high demand by users who had heard of the benefits of broadband but were unable to obtain cable. The rollout didn't commence as quickly as consumers would like, with Telstra claiming it would take two years to finish the rollout of the ADSL network.

Both AMD and Intel had important technology releases in the final quarter of 2000, which would hint at the direction the market was to take in 2001. Interestingly system memory was a major area of innovation for both manufacturers, with AMD supporting the push for DDR RAM whilst Intel tried to kickstart interest in the RDRAM format once again.

DDR RAM hits the scene

AMD was first up to release its 133MHz FSB Athlons, initially housed on AMD's new 760 DDR RAM-enabled chipset. Initial benchmarks showed an approximate 10% increase in performance with the new combination. The Athlon had reached speeds of 1.2GHz by year's end and sold for as low as half the cost of an equivalent Intel CPU.

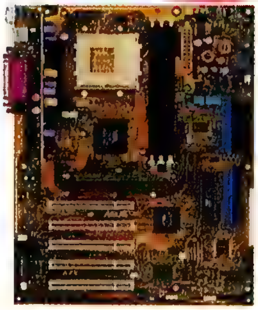
Intel had an even bigger release with the unveiling of the Pentium 4 running at 1.5GHz, with its brand new NetBurst architecture and running only with RDRAM. The P4 wasn't the most predictable CPU when it came to benchmarking, and the market is still rather undecided about whether or not the P4 is really as powerful as all the marketing hype claimed it to be. We atomic lab rats had to find out for ourselves and we came to the conclusion, that for current applications, the Thunderbird at 1.2GHz outpaces the P4 at 1.5GHz in the majority of tests. However, future applications with SSE2 optimisations might finally show the worth of the new Intel NetBurst architecture, as well as higher speed versions.

It proved to be a very competitive year on the PC hardware front that revolved around the actions of three key companies: VIA, Intel and AMD. We at atomic like to think of Y2K as the 'Year of the Chipset', as all of the major CPUs were so dependant upon a decent motherboard design for them to succeed. This reliance allowed VIA to increase its already large share of the chipset market, by having popular chipsets available for both the Intel and AMD platforms in a motherboard market that was so underpopulated it just wasn't funny. Without VIA's assistance in creating a suitable chipset, AMD wouldn't have had such a great year. Thankfully VIA came through with the goods, allowing AMD to establish itself as a real threat to Intel.

atomic Y2K HOT HARDWARE AWARDS

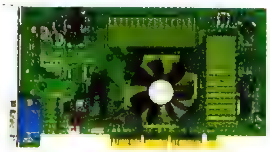
Motherboard of the Year: Asus A7V

How can we say the i815 chipset is the best chipset of 2000 in one breath, then say the KT133 chipset based A7V is the motherboard of the year in the next? All we have to say to that are two words: multiplier overclocking. The A7V enabled Athlon and Duron CPUs to be multiplier overclocked without the use of a GoldFinger device. As well as all the other frills such as 4X AGP and Ultra ATA/100 support, the board also had a wide range of overclocking settings other than the multiplier adjustments.



Video Card of the Year: NVIDIA GeForce Series

NVIDIA's GeForce family of video cards win our pick for the Video Card of 2000. Since the original GeForce's release in late '99, this family of video cards have consistently thrashed the opposition, from the budget priced MX model up to the pricey Ultra. The decision to include DDR RAM paid off at higher resolutions.



Chipset of the Year: Intel 815

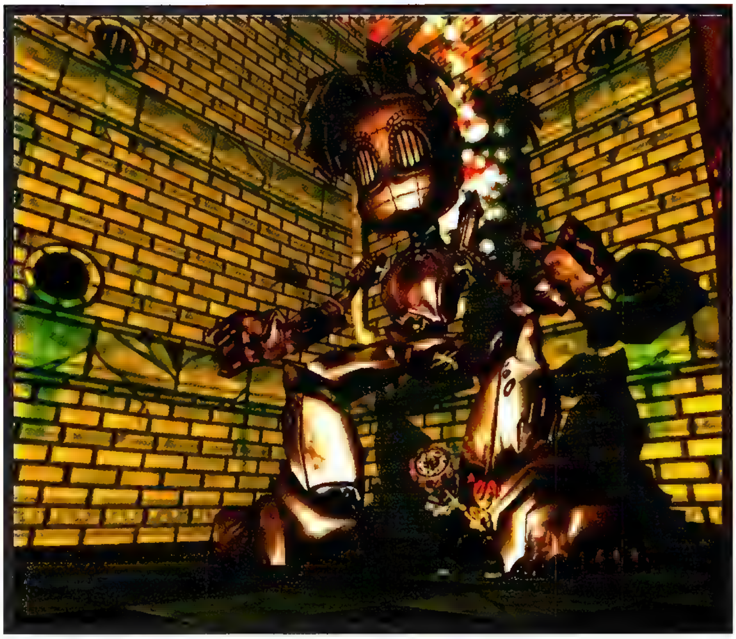
The i815 chipset solved a lot of problems for Intel. Finally it had a 133MHz FSB motherboard with SDRAM support, as well as 4X AGP and Ultra ATA/100 support. While the Socket A boards often had problems with stability, the i815 proved itself to be a rock solid platform, and the memory performance problems of the VIA chipsets were not repeated in the i815 chipset.

2001 – What we can look forward to

If you thought 2000 was a hectic year in terms of PC hardware releases, 2001 will see the wave of new releases swing to the console market. Following the myriad of technological innovations in the PC market of last year, 2001 should establish which of the competing technologies will take hold.

Intel's Celerons have been held back in the past by their 66MHz FSB, an artificial constraint imposed by Intel to help differentiate between the performance of the Celeron and the PIII. 2001 is the year that the Celeron finally gets the 100MHz FSB, with the Celeron 800MHz in January. This change to a 100MHz FSB was prompted by the thrashing of the Celeron at the hands of AMD's Duron CPU, but is it enough to equal the performance of AMD's wonder chip?

Depending upon AMD's actions with the Duron, the Celeron should reach 850MHz by mid year and 1GHz by year's end. By this stage all Celerons will have moved over to the 100MHz FSB.

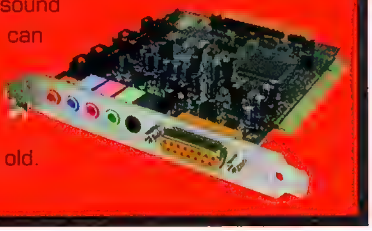

ⓘ The Xbox boasts amazing visuals

Will DDR RAM succeed?

AMD's recent move to DDR RAM might not be as successful as it had hoped. Benchmarks of the new 133MHz FSB SDRAM motherboards for Athlons show approximately an eight per cent increase in performance over the standard 100MHz FSB with SDRAM. Compare this with the ten per cent increase found on the 133MHz DDR boards, and we see that DDR RAM may only account for around a two per cent increase in performance. Whilst DDR RAM is much cheaper than RDRAM memory, it is still double the price of SDRAM in Australia, making this minor increase in performance a very expensive but not very worthwhile upgrade.

Sound Card of the Year: Creative Soundblaster Live! Series

With the demise of Aureal in 2000, the atomic Sound Card of the Year award really was a one horse race. That's right folks, Creative's Live! Series of cards take the cake. This isn't necessarily a bad thing, as those with a Live! sound card and surround sound speaker setup can attest, even though the EMU-10K1 is getting a little old.



Comeback of the Year: AMD

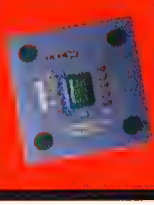
The Athlon hinted at what AMD was capable of, but it wasn't until the Thunderbird Athlons hit the scene mid-2000 that AMD finally had a CPU as fast as Intel's PIII range. The fact that AMD could sell these CPUs at less than half the cost of a similarly clocked PIII left Intel to sit back and watch as AMD swallowed a huge chunk of the performance CPU market.

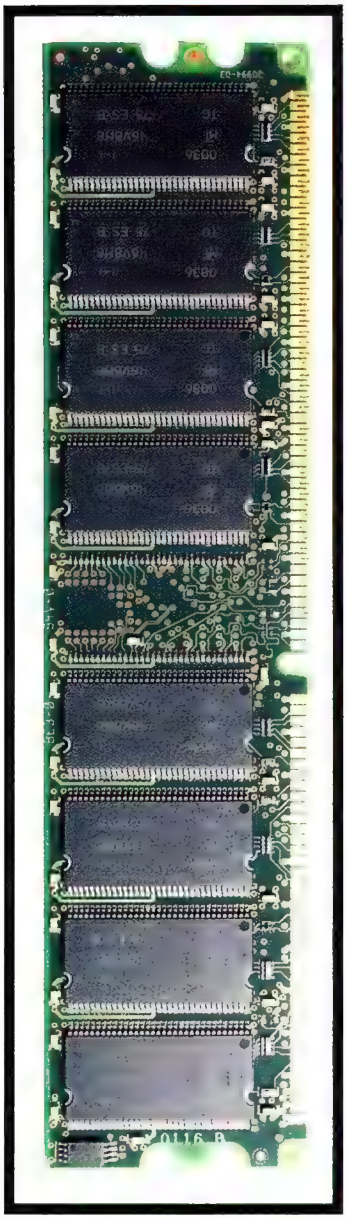
Notable Entry of the Year: Intel Pentium 4

Whilst not performing quite how the market expected it to, Intel's new Pentium 4 microarchitecture was designed with the future in mind. At its release speed of 1.5GHz, many of the benchmarks don't score too impressively on the P4, but as the CPU scales to speeds of at least 2GHz, we are sure to see some phenomenal performance increases. The exceptional memory bandwidth provided by the quad-pumped 100MHz FSB and speedy RDRAM should ensure that memory bandwidth won't soon become a bottleneck.

CPU of the Year: AMD Duron

This cut down version of the Athlon Thunderbird core performed approximately 10 per cent worse than a similarly clocked Athlon, yet sold for around 60 per cent of the cost. Given the already low price of an Athlon, the Duron represented unbeatable value for money. They also proved to be very overclockable, making them even better value for money.





2001 will be a decisive year for DDR RAM

By the end of Q1, AMD's new Palominos should be rleased, debuting at 1.33GHz. The only changes this will have over the current Thunderbird Athlons are a lower heat output and a lower voltage requirement. There are suggestions that AMD are going to lower temperatures by using an isotopically pure silicon wafer manufactured by Isonics.

Palominos for all!

The Duron is based on a cut down version of the Thunderbird Athlon CPU, so when the Athlon moves to the Palomino core the Duron will follow suit. This new Palomino cored Duron is currently known as the Morgan.

At the time of the Palomino AMD will release a version for mobile computers, a market still dominated by Intel. Due to the high temperatures and power requirements of the Thunderbird core, AMD have been held back from supplying chips to the mobile market. However with the lowering of these in the Palomino core, as well as support for AMD's PowerNow! (a power saving feature that scales back the speed of the CPU as necessary) it looks as if Intel's hold on the mobile market might not be as unshakeable as it would like.

AMD will be releasing one new chipset throughout the whole of 2001, the 760MP chipset with full SMP support and a 133MHz FSB, hopefully helping AMD to enter the server market. Other than this chipset, AMD will be relying upon VIA, SiS and ALi to provide chipsets for AMD CPUs. However, the motherboard situation this year is looking much more favourable for AMD.

NVIDIA are entering the motherboard chipset manufacturing game in 2001. The chipset is currently known as Crush, and will support Socket A Durons and Athlons and should feature both integrated sound and video.

Plans for the PIII

The Pentium III range of CPUs will be stuck at 1GHz for a while, with Intel re-releasing the 1.13GHz PIII in Q2 of 2000 that should finally be stable. By mid year, Intel's slowest PIII should be the 933MHz, and by year's end only the 1GHz and 1.13GHz parts will be available. DDR RAM support for the PIII has just been released in the form of VIA's Apollo Pro 266 chipset.

Due to the difficulty programmers have reported while programming Sony's little black box, don't expect a flood of top quality games in the early to middle parts of the year for the PS2. Hopefully by Q3 we will start to see some games that show off the power of the unit, but until then, the Dreamcast will likely have the strongest software line-up. Dreamcast hardware production will cease in March, but software development for the DC should continue for at least another year.

The mighty Xbox

In September the console that PC lovers are most anxious to get their grubby little mitts on, Microsoft's Xbox, will be released. The specs for this machine read more like a PC than a console; a 733MHz Intel CPU with a 250MHz NVIDIA graphics processor and 64MB of system memory. Using a heavily trimmed and optimised version of the Windows 2000 OS, it will ship with a 2-5X DVD drive as well as an 8GB HD. NVIDIA will also be supplying the audio chipset for the board, capable of 64 3D channels. The NVIDIA graphics chipset is rumoured to be related to the NV25, and is capable of pushing out 125 million polygons per second.

Due to the Xbox being so closely related to the PC, we can expect to see many titles being released simultaneously on both platforms. If the Xbox versions happen to look better than the PC versions, the PC market could be in for a major shake up as gamers flee in droves to the console market. We'd like to think that by then PC technology will be far ahead of the Xbox's, but the fact remains the Xbox will be able to utilise its lower specifications much better than a PC due to its optimised console nature.

0.13 micron manufacturing

Q3 will see Intel move from its 0.18 micron manufacturing process down to a 0.13 micron process with the release of the PIII codenamed Tualatin-256. Other than this change in manufacturing size, there will be no enhancements to the PIII Coppermine core. Unfortunately it looks as if this CPU will not be compatible with any current Socket-370 motherboards. Q3 will also be the period that the P4 finally gets SDRAM support with the release of the Intel Brookdale chipset.

At the same time that the PIII moves to a 0.13 micron process, the P4 will do the same. This new version of the P4 is currently known as the Norwood, and will require a new socket 478 motherboard to run on.

Entering the second half of the year, Intel are planning on releasing its 1.7GHz P4, with its 2GHz P4 slated for release by years end. We wouldn't be surprised if the 2GHz P4 hits shelves mid year, with a 2.5GHz part out by Q4, in a bid to help Intel snatch the performance crown back from AMD.

Nintendo to make a comeback?

Following soon after the Xbox release is Nintendo's GameCube. Nintendo has taken the stance of "not the fastest, but the nicest to develop for" after encountering development problems with its N64. It will utilise an IBM Gekko 405MHz CPU and 32MB of main system memory paired up with the ATI Flipper chipset, which has integrated graphics and sound. It will be utilising a new memory technology known as 1T-SRAM for 24MB of the main system memory as well as another 16MB that Nintendo calls 'A' memory, which is shared by different components.

ATI is also supplying the audio chipset for the GameCube, just as NVIDIA is for the Xbox. This will only support stereo sound upon its release, which to us seems like a huge oversight on Nintendo's part. The GameCube will not support DVD due to its Matsushita developed 8cm proprietary 1.5GB GameCube disk drive. Good to see Nintendo has finally ditched the cartridge format. Nintendo are highlighting the ease of use developers will have when developing for the GameCube. By doing so it is hoping that developers will be able to focus much more on game development than technical problems, enabling the creation of richer gaming experiences in shorter periods of time.

> **"Good to see that Nintendo have finally ditched the cartridge format."**

It is interesting to note that the Xbox will be going into battle with an NVIDIA chipset, while the GameCube runs on an ATI chipset and the Dreamcast has a PowerVR graphics chipset. This mirrors the video card battle we will see over the year between these companies in the PC hardware sector. It could be the strength of any of these chipsets that determine the fate of the console market.

The 2GHz barrier

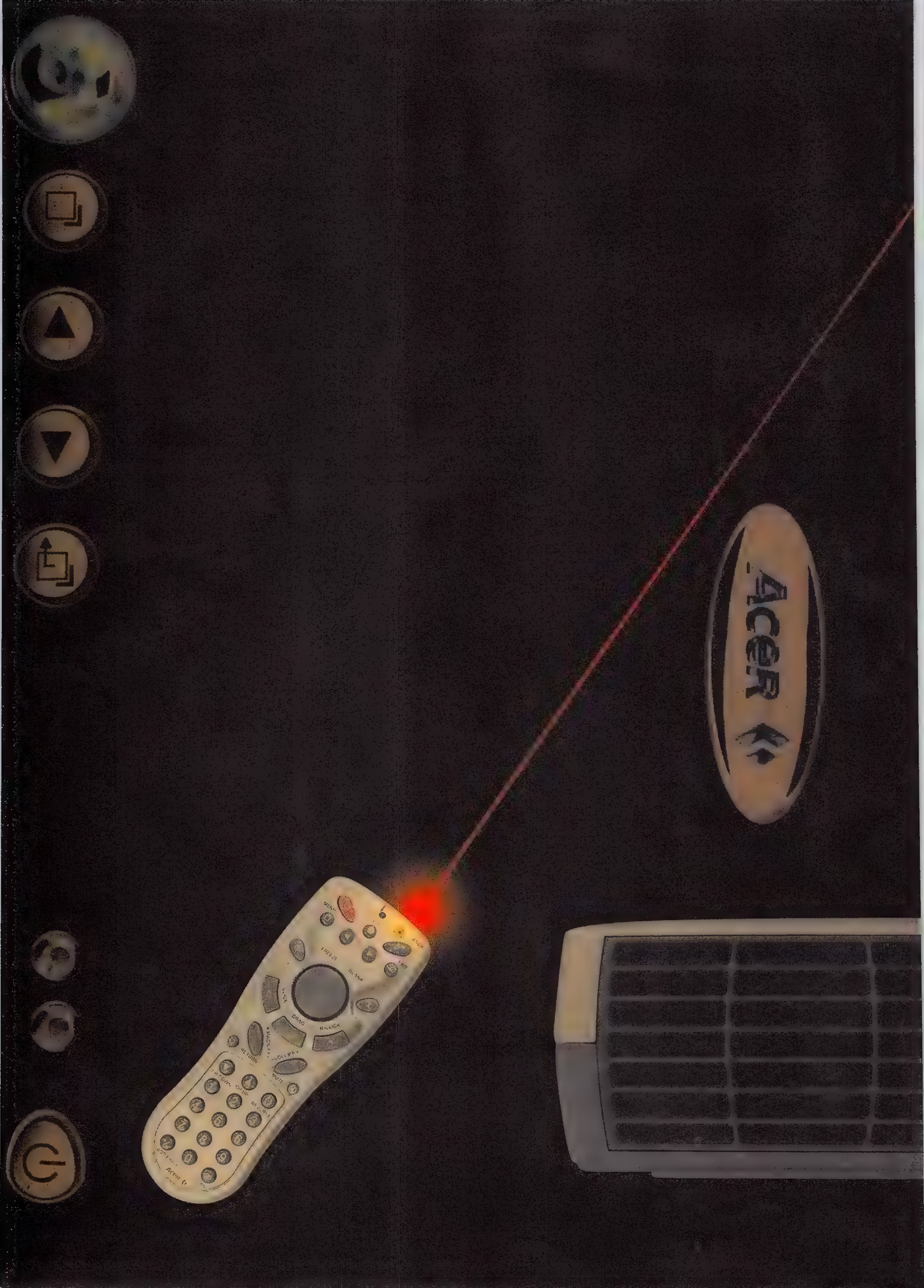
By year's end, the Palomino should be at 1.7GHz, with a chance that it will reach as high as 2GHz. If this is the case, Intel should be worried as the Athlon platform has been proven to be faster than an equivalently clocked P4. There is no way the market will take to the P4 if there is a faster AMD equivalent that is selling for a fraction of the cost. By this time the market should also know whether or not the P4's SSE2 instruction set has been accepted by software developers. If SSE2 doesn't take off in the market, it may well cause the P4 to turn out to be Intel's biggest flop.

The final design of the Xbox case

Nintendo's GameCube is surprisingly cube shaped

This year will prove to be critical for Intel after its less than stellar performance last year. Although it still performed well financially, many of the hardcore PC users lost respect for the giant and discovered a new found love for AMD. Usually, the mass consumer market will follow the path of the hardcore users six months down the track, so 2001 should prove to be a great year for AMD. With Intel's expensive P4 left hanging in the breeze, waiting for the market to decide whether or not they will choose that upgrade path, it should prove to be a decisive year for the AMD/Intel battle.

The console market is going to be the site of some heated competition in 2001. Sega's Dreamcast will start to show its age when compared to the three other consoles, although at present we still treasure our precious Dreamcasts, even when compared to the PS2. Sony's PS2 should start to see some great software titles, but with the entry of Microsoft with it's Xbox as well as Nintendo's GameCube, it's anyone's guess as to who will be leading this sector by next Christmas.


ACER
MENU
FREEZE
DRAG
R-CLICK
RETURN
VOLUME
MUTE

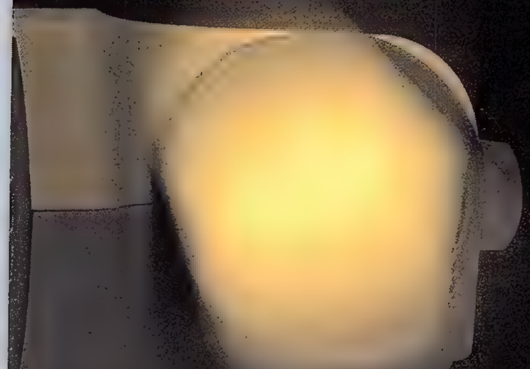
reviews

We've given our hardware reviews section some minor tweaks to give you what you asked for, because atomic is your mag and you wanted it.

The people have spoken and we have listened. It seems that our beloved readers want to see the inclusion of prices for our hardware reviews. Initially we thought we wouldn't include them, as most prices in IT mags are inaccurate at best and misleading at worst. It looks as if you folks still desire that information though, so we'll endeavour to include an accurate recommended retail price at the time of printing.

You can now see a breakdown of our common benchmarks and reference systems at the start of every month's hardware section. We know how important this information is to replicate our tests so you can see exactly how your box stacks up against the rest.

These won't be the only tests we use though, as there are always newer and more relevant benchmarks more suitable for the more obscure component testing, such as hard drive or CD-R benchmarks. Oh for the day of a comprehensive benchmarking suite that can be run in one batch...



benchmarking software

3DMark2000 Pro - www.madonion.com
Quake III: Arena - www.quake3arena.com
SiSoft Sandra Professional 2000
www.sisoftware.co.uk
MDK2 - www.bioware.com
Evolva - www.evolva.com
Video2000 - www.madonion.com

atomic benchmarks

Take a look inside the atomic Labs testing procedures

Here at atomic it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking - and this is something that we take very seriously in the atomic Labs.

atomic Applications Benchmark

The atomic Applications Benchmark suite uses an assortment of off-the-shelf applications and is an excellent test of a system's overall performance, including CPU, RAM, hard disk and graphics card, when running conventional 2D programs. Desktop resolution set to 1,024 x 768 at 32-bit colour, DMA enabled, latest drivers for all hardware including chipset inf updates.

SiSoft Sandra 2000 Professional

Sandra, from SiSoftware (www.sisoftware.co.uk) is a comprehensive benchmark and diagnostics utility. It contains dozens of special module applets that retrieve detailed information about the specification and settings of a system by polling each component's built-in firmware or BIOS. Sandra also features a small suite of synthetic benchmarks for specific components such as CPU, memory, CD-ROM and hard disk.

3DMark2000 Pro

3DMark2000 Pro from MadOnion (www.madonion.com) is a powerful benchmark for testing Direct3D performance, and is the successor to the popular 3DMark99 MAX. Although it is a synthetic benchmark, it uses the advanced Max Payne 3D engine which is representative of the latest in Direct3D performance and technology.

Quake 3: Arena

Quake 3: Arena, from id Software, is the extremely popular first-person shooter that represents the latest in OpenGL gaming technology. Q3A has a built-in benchmarking utility and some built-in demos that can be used to test graphics card performance. These demos are fairly simplistic, however, and are not representative of the worst conditions that the game can offer to a graphics card, so we developed our own atomic demo that pushes the hardware as far as possible.

Other Benchmarks

Sometimes we need to break down the tests into more specific areas, such as hard disk performance, or a particular facet of 3D, like transform and lighting or SSE. For this we can draw upon a vast number of applications, games and dedicated benchmarks for these specific purposes, such as MDK2, Adaptec Threadmark or Mercedes Benz Truck Racing. Whenever we use one of these special benchmarks we will outline the nature of the tests, the testing procedures as well as any settings we use.

atomic Testbench specs

There are two testbenches in the Labs, one for running AMD processors and one for Intel processors. Both are running Windows ME, DirectX7.0a, Liveware 3.0 for Windows ME and Detonator 6.31 reference drivers. For your reference, in all our benchmark tests we have included yardstick scores showing how our two testbenches perform in that test.

- **AMD Athlon Thunderbird 1GHz system – ASUS A7V motherboard**
- **Intel PentiumIII/1GHz system – ASUS CUSL2 motherboard** (Both supplied by CASSA, (07) 5445 2992, nathan@cassa.com.au)

Common Components

- **Transcend 128MB PC133 CL2 SDRAM** (Supplied by CASSA)
- **Hercules Prophet II GTS 32MB** (Supplied by Guillemot, www.hercules.com)
- **SoundBlaster Live! Player** (Supplied by Creative Labs Australia, www.creaf.com)
- **ASUS 12x DVD-ROM** (Supplied by CASSA)
- **7,200rpm UDMA66 20GB hard disk**
- **Floppy drive**
- **300 watt PSU**

Benchmark settings

3DMark2000 Pro

- **1,024 x 768, 16-bit colour, 16-bit textures, 16-bit z-buffer, triple frame buffer**
- **1,024 x 768, 32-bit colour, 32-bit textures, 24-bit z-buffer, triple frame buffer**
- **1,600 x 1,200, 16-bit colour, 16-bit textures, 16-bit z-buffer, triple frame buffer**
- **1,600 x 1,200, 32-bit colour, 32-bit textures, 24-bit z-buffer, triple frame buffer**

Quake 3: Arena

- **CPU: 320 x 200, max geometry detail, lowest graphics settings, high sound quality**
- **Graphics cards: 640 x 480, normal quality graphics settings, high sound quality**
- **1,024 x 768, all graphics settings maximum, high sound quality**
- **1,600 x 1,200, all graphics settings maximum, high sound quality**

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The Portable WebCam with More Features and More Fun!
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Create
With Built-in Voice Annotation Recorder

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Also available:

Video Blaster WebCam Go
Great for capturing digital snapshots on the GO! The detachable WebCam Go has 4 MB built-in memory for capturing about 90 still images while on the move. Or simply hook it up to your PC for video-conferencing, creating personalized e-mail postcards or full-motion videos!

Video Blaster WebCam 3
The ideal PC web camera for video-conferencing, surveillance, capturing digital images and full-motion videos! WebCam 3 captures web-ready images at 640x480 resolution, and is so easy to operate, even kids can use it!

If you are a current customer or Creative product owner, please note our NEW technical support number : (02) 9666 6500 and our NEW main office number : (02) 9666 6100.

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PERSONAL DIGITAL ENTERTAINMENT
Starts Here.

CREATIVE

Acer 7765PE

Bennett Ring tries not to drool all over this high-resolution projector

specifications

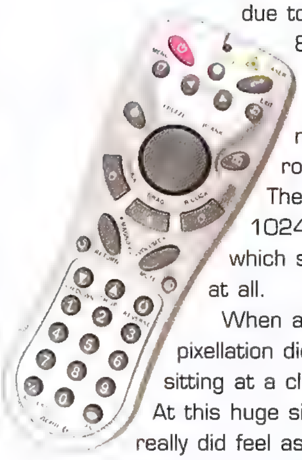
- Weight: 2.3kg
- Inputs: D-Sub 15-pin, Mini-Din 8 pin (for mouse); (S-Video x 1, Audio mini-jack x 2, Composite Video x 1) – with add-on A/V adaptor (Tuner x 1,S-Video x 1, Audio mini-jack x 2, Composite Video x 1) – with add-on TV adaptor – compatible with NTSC, PAL and SECAM
- Distance: 1.5~5m
- Display Size: 25in~110in

price

$8,999

When it comes to displaying images on a large scale, projectors are hard to beat. With their small size, light weight and simple installation, they have revolutionised the display market.

This phone book sized unit weighs in at a meagre 2.3kg due to its magnesium alloy body. The unit's 800 ANSI lumen lamp doesn't make it the brightest projector on the market but we found brightness levels to be more than acceptable even when in rooms that weren't totally darkened. The maximum resolution displayed is 1024 x 768 at a refresh rate of 60Hz, which surprisingly wasn't hard on the eyes at all.



When at its maximum viewable size of 110in pixellation did not become a problem, even when sitting at a close viewing distance of two metres. At this huge size DVD movies came to life, and it really did feel as if my lounge room had been transformed into my own personal cinema.

Counterstrike was the first game to be tested and it was here I noticed the only major flaw of the projector. Areas of the screen that were darker or in shadow tended to merge into one dark area. Objects further away were also slightly harder to see, however the sight of ten four foot terrorists running around on my lounge room wall won't be forgotten soon. I then fired up a few flight sims as well as Alice and was again blown away by how immersive the games become when the onscreen action fills your entire field of view.

Powerhouse of projection

This little powerhouse of projection tends to get rather warm after short periods of time. To combat this, Acer have built a cooling fan into the unit that tends to be a little noisy during the quieter sections of movies, though not to the point of being unbearable.

Setting the unit up was simple, using the standard 15-pin D-Sub connection of most monitors. Just make sure you set your resolution and refresh rates to something the 7765PE can handle.

If you have the cash and are after a portable unit that would be great to haul to LANs, DVD nights and the like, you will find the Acer 7765PE more than adequate for your needs. This projector is amazing for games that don't require extreme visual accuracy and you'll likely never go to the cinema again.

atomic 8.5/10

ELSA 3D REVELATOR

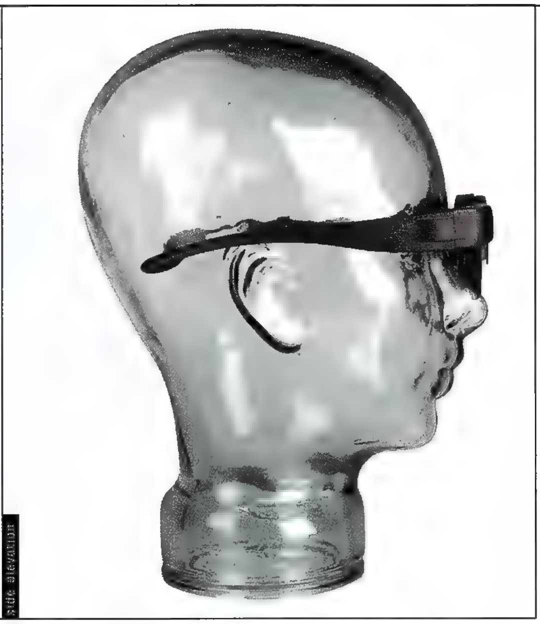
John Gillooly wears his fun-glasses at night

specifications

- LCD Shutter glasses
- Support NVIDIA based video cards (TNT, TNT2, GeForce256 and GeForce2
- Use an infrared sensor for wireless connectivity.
- Require a monitor capable of 100Hz refresh rates
- Support Direct3D applications.

price

$110.00



Well, the good news is my headache has finally subsided. For some unknown reason there are several types of 3D gaming glasses on the market nowadays. The REVELATOR uses LCD shutters over each of the eyes in combination with your monitor to give the illusion of true 3D, which is fine in theory.

Installation involves the use of a monitor pass-through cable, connecting to an infrared sensor for the glasses. After checking that your monitor supports 100Hz refresh rates at usable resolutions, the next step involves throwing the supplied CD across the room, then hitting the Web to download the latest drivers from ELSA. These drivers add some OpenGL support, as well as support for more recent NVIDIA chipsets.

Once the drivers are installed and after some head scratching over not being able to find all the control panel options, it was back to the Web site to download the extra piece of software to get the glasses running.

Testing 1, 2, 3D

Firing up the looping demo in 3DMark2000 Pro had jaws dropping and people fighting over the glasses. It looked good. So we started up some of the supported games. This was when the performance hit was first noted. These glasses slow the game down a lot. They are also incredibly disconcerting to use. After taking the glasses off (after 20 minutes or so) I started bumping into walls and seeing double. And then the headache arrived.

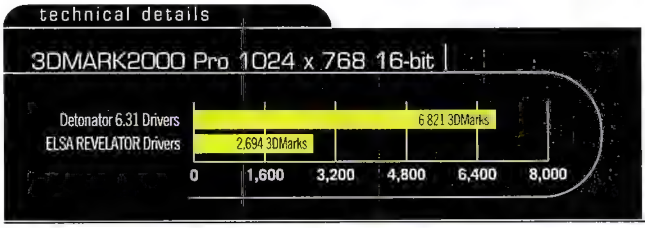
> "These glasses slow the game down a lot"

Noticing the performance hit, we decided to run some benchmarks with and without the ELSA drivers. Seeing as the glasses are designed mainly for Direct3D we ran the 3DMark2000 Pro and Evolva benchmarks and noticed a stunning difference in performance. Evolva averaged 97.2 fps with detonator 6.31 drivers and 26.2 fps with the REVELATOR drivers, which is almost a 75 per cent decrease in performance. In 3DMark2000 Pro the performance hit was almost 60 per cent.

We then ran it up in Quake 3: Arena to see how it fared in OpenGL. Nothing happened. So back to the Web site again. After some searching we deduced that the glasses only worked with TNT based cards in OpenGL, so a quick swap to a TNT 2 Ultra was made and OpenGL worked.

It becomes very difficult to justify the world of 3D when weighed against such huge performance hits and heavy-duty system requirements. The ELSA REVELATOR is the best of the current batch of 3D glasses but it is still a long way from everyday functionality.

atomic 5/10



YAMAHA TSS-1

David Kidd applies some Pro Logic to Yamaha's new speakers

specifications

- 5 x 6 watt satellites
- 18 watt subwoofer
- separate upright amplifier unit
- analogue and digital optical and co-axial inputs, including optical cable

price

$499.00

Yamaha has traditionally produced a high standard of audio equipment that is usually just out of reach of gamers and budget users. With the TSS-1 pitched as an all-round home entertainment sound system, Yamaha's foray into 5.1 sound systems has provided gamers and home theatre enthusiasts with a versatile audio option.

The Yamaha TSS-1 comes in Calypso Black (black) or Computer Platinum (vanilla) with 5 x 6 watt satellite speakers, an 18 watt subwoofer and a separate amplifier unit. The amplifier unit is impressive in all respects, featuring optical, coaxial and analogue inputs housed in an upright tower - perfect for those with limited desk space. The TSS-1 is also uncharactistically elegant when placed alongside a PC. Its modern, compact design suggests that Yamaha intend their new 5.1 speaker set to be used in your living room as well as your PC desktop.

Feature packed

It used to be that all you wanted from a set of speakers was some good quality loud noise and a general "scare the neighbours" bass level. Not anymore. With the advent and rise of DVD and computer audio, speakers are moving rapidly into the realm of electronics. The Yamaha TSS-1 is definately no exception to this rule, with a veritable plethora of added extras.

Containing DTS, Dolby Digital and Dolby Pro-Logic decoding, selecting the output via the amplifier is made simple through the face panel. Specific (centre, surround, subwoofer) volume adjustments can also be adjusted through the face panel giving the user more direct control over surround sound performance without relying on software. With such an impressive feature-set the TSS-1 quickly becomes a very flexible option for both gaming and DVD playback.

For sound quality, the TSS-1 offers clear surround positioning with little noise. Watching *The Matrix* on DVD produced an increasingly immersive experience showing off Dolby Digital surround to full effect. This also translates into game play. Footsteps are easily located (Counterstrike players take note) and the sound of a rocket roaring past was clearly positioned. Unfortunately, as with the DVD audio, I found that extra level of massage-your-insides type of bass to be out of reach, lacking that extra 'oomph'. CD audio was more impressive, showing the TSS-1 to be a well-balanced set. Vocal ranges were clear, even at high volume with low-range bass frequencies maintaining a distortion-free sound.

The TSS-1 takes advantage of Yamaha's Active Servo Technology (YST). Yamaha claims its YST will 'adjust the negative impedance generated as a speaker moves'. This means that rather than having deep bass sounds 'leaking' out of the unit, the sound is forced through the air port of the speaker. By improving the interaction between amplifier, source and speaker, a system engineered with YST will thus theoretically provide a wider frequency range delivering smooth, clear low-frequency sounds. The TSS-1 proved true to the technology, providing well-integrated audio in all testing situations.

Yamaha has provided enough features in this six-speaker set to impress. The inclusion of digital inputs, and the availablity of a specialised optical cable, suggests these speakers will compliment the increasingly affordable next-generation of feature-packed soundcards (see the Hercules Game Theater reviewed in this section). Although sound quality could be better and they could be more affordable, the Yamaha TSS-1 is a good choice for those who want the features and versatility that this package has to offer. ○

atomic

8/10

Cambridge DTT2200 Desktop Theater 5.1

David Kidd wakes up the neighbourhood with Cambridge's latest setup

specifications

- 5 x 5 watt satellites
- 17 watt subwoofer
- remote volume control
- 1/8 triple stereo line-in ports

price

$349.00

front/back elevation

The Cambridge Soundworks range of PC speakers is known for providing great sound quality at an affordable price. Cambridge has entered the 5.1 world with the DTT2200, DTT2500 and DTT3500 six-speaker systems with the only featured difference being digital capability and a built-in Dolby decoder. Given that Cambridge have released varying grades of 5.1 speaker sets at the same time, the DTT2200 will be considered with respect to its bigger brothers in terms of functionality and purpose.

The Cambridge DTT2200 essentially adds an extra speaker to the already successful FPS2000 speaker set to total 5 x 5 watt satellite speakers with a 17 watt amplifier/subwoofer unit. The space-saving logic of a combined amp/sub with a remote volume control unit has always been lost on me. Considering we're looking at a more complex 5.1 system, a separate desktop amplifier with more direct and convenient volume control could be more beneficial.

Physically, all components are relatively heavy, giving a sense of durability and quality while speaker placement is made easy with the inclusion of wall mounts and a center-speaker monitor stand. As with all Cambridge 5.1 speaker sets, the satellites are 89mm cubes with stable desktop stands however, unlike the 2500/3500 sets the DTT2200 does not feature a designated, high output center-speaker.

Originally intending to use the set with the Hercules Game Theater XP (see the review in this section) the only inputs included with the set were 1/8 triple stereo line-in analogue cables. Without a built-in decoder the DTT2200 requires a six-channel 5.1 audio card. Due to the absence of optical and coaxial digital inputs this multimedia audio system is clearly a cheaper alternative to the DTT2500, ideally for use with the new Sound Blaster 5.1 range.

This is indicative of Creative's strategy. Rather than create speakers with the full range of mod cons (and added expense) like inbuilt DTS, Dolby Digital and Dolby Pro-Logic decoding, Creative has focused upon building the perfect complement to its wide range of Sound Blaster sound cards, and their 5.1 cards in particular.

Clarity and quality

Sound quality was great in CD audio with DVD playback showing clear and accurate 5.1 sound capability through the high-quality satellites. Games (Thief 2, Half-Life) sounded great, showing off 4-speaker EAX with that heightened sense of immersion needed to truly experience First Person Shooters and other action games. At high volumes low-frequency bass levels remained stable with little distortion whilst the satellites provided an overall clean sound from mid to high range.

The DTT2200 look fantastic, with simple lines and the ever popular colour scheme of black. These are definately speakers you would be proud to have sitting beside your beloved computer.

This speaker set has an incredibly impressive sound, well suited to all forms of PC home entertainment. The flaws in the set simply target these speakers to budget users who want basic, all-round audio capability. While lacking the versatility and features of the DTT2500/DTT3500 the DTT2200 more than makes up for it with a great sound at a very reasonable price. For those looking to marry their Sound Blaster 5.1 card with a great looking, fantastic sounding, financially sound speaker set, the DTT2200 is a most likely suitor in an ever increasing market of feature packed surround speakers. ○

atomic
7.5/10

Sony PFM-42B1E

John Gillooly becomes the target of instant envy in the atomic offices

specifications

- Capable of resolutions up to 1600 x 1200
- Ultra thin screen
- Flat, vibrant image
- capable of multiple inputs, including 15 pin D-Sub, BNC and Mini DIN

price

$13,970

Whilst priced squarely in the "tell him he's dreaming" bracket, the Sony PFM-42B1E is, at first glance, one desirable piece of equipment. Unlike traditional Plasma screens, which were limited to VGA resolution, this new model is capable of a variety of resolutions, based on a 1024 x 1024 pixel matrix.

In plasma screens, each pixel in this matrix contains three bulbs, each filled with gas. When a current is passed through the bulbs the gas is converted to the fourth state of matter, plasma, and light is emitted. The result is a perfectly flat, vibrant image, which is perfect for DVD and TV watching.

The ins and outs

The PFM-42B1E has a plethora of inputs, accepting everything from 15 pin D-Sub cables to BNC and Mini DIN composite plugs. This incorporates computer, television, video, DVD, HDTV input, you can basically throw anything you want at the screen. For computer input the screen is capable of a whole host of resolutions and refresh rates up to 1600 x 1200 at 60Hz.

The major problem is that because the screen has a 16:9 aspect ratio and 1024 x 1024 pixels, you end up with a stretched computer image, which creates problems when gaming, especially in the precision world of First Person Shooters. The screen can display in 4:3 but the stretched pixel problem remains. The reason for this harks back to the three-bulb composition of the pixels. These three bulbs line up horizontally, which means that the display will always be stretched.

> "For computer input the screen is capable of a whole host of resolutions and refresh rates ..."

That said, this is a jaw-dropping piece of equipment. Much sexier than a run-of-the-mill rear projection TV and requiring a lot less space than a good projection setup, the sleek silver lines of the PFM 42B1E certainly impress. For DVD and normal television operation, and for pure cool factor this is the screen to have, however for computer based operations like gaming and word processing the irregular pixel shape detracts. This screen is at best a beautiful thing to show the latest rolling demo of Halo on, and that is about it for its use as a monitor. ○

atomic 7/10

Hercules Game Theater XP

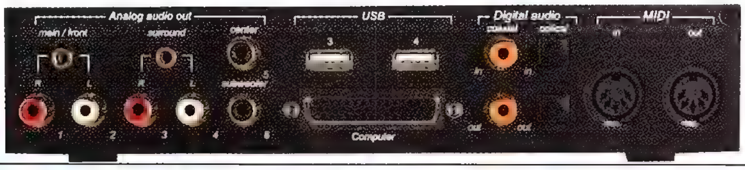
atomic HOT

specifications

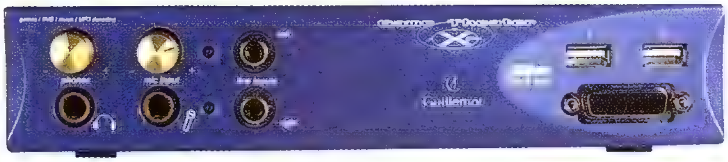
- Supports EAX, A3D, DirectSound, Sensura MacroFX
- Game port and 4 USB ports
- Optical and Coaxial inputs and outputs

price

$299.00



back elevation



front elevation

The Hercules Game Theater connects via a PCI card and an external console. Essentially an audio input/output station the console contains a 4-port USB hub, game-port, digital (coaxial and optical) inputs and outputs, 6 RCA outputs, stereo L/R inputs and MIDI-In/MIDI-Out DIN ports. Those with cramped desk-space beware- this rack demands its own personal space and will dress up and drab computer desk nicely.

MP3, MiniDisc and DAT devices can be easily connected through the digital in/out ports making it ideal for music fans while DVD enthusiasts will benefit from the 5.1 compatibility through bundled PowerDVD software and gold-plated line-out RCA connectors.

The real benefit applies to gamers with 2 USB ports and a game port located on the front panel allowing convenient connection for gamepads, steering wheels and joysticks. Combine this with support for all sound APIs and you have a very attractive gaming package. Sadly, the configuration utility, is a big letdown, being simple fare with only the most basic setup options.

While not the cheapest sound card available, for the price the Hercules Game Theater offers more features than any other audio card. Highly recommended for those who like things with lots of sockets. ▢

atomic
9/10

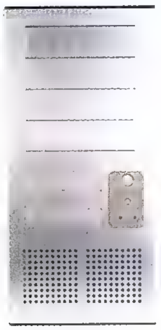
Lian Li PC-60 Case

specifications

- Thumbscrews on everything
- Looks great
- High quality engineering
- Aluminium

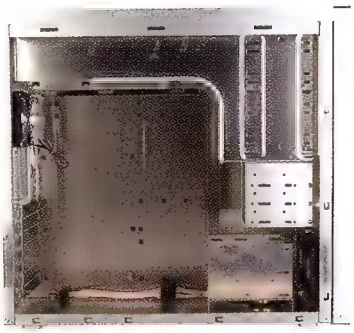
price

$299.00



front elevation

power switch



side elevation

The Lian-Li case is constructed for the most part of an aluminium alloy, aiding in heat dissipation (aluminium dissipates heat faster than the steel used in most cases) and greatly reducing the weight of the case. It uses a totally tool-less design, making the installation of parts a total breeze, although the thumb screws used can become slightly loose over time.

The case includes three inbuilt adjustable-speed fans that circulate cool air through the case, allowing for significant drops in CPU, motherboard and case temperatures. The ten drive bays, as well as the rearward sliding motherboard mount, are both features that will be welcomed by the tweaking crowd. The sliding motherboard mount does feel slightly flimsy as a result of the aluminium construction but this isn't a major problem.

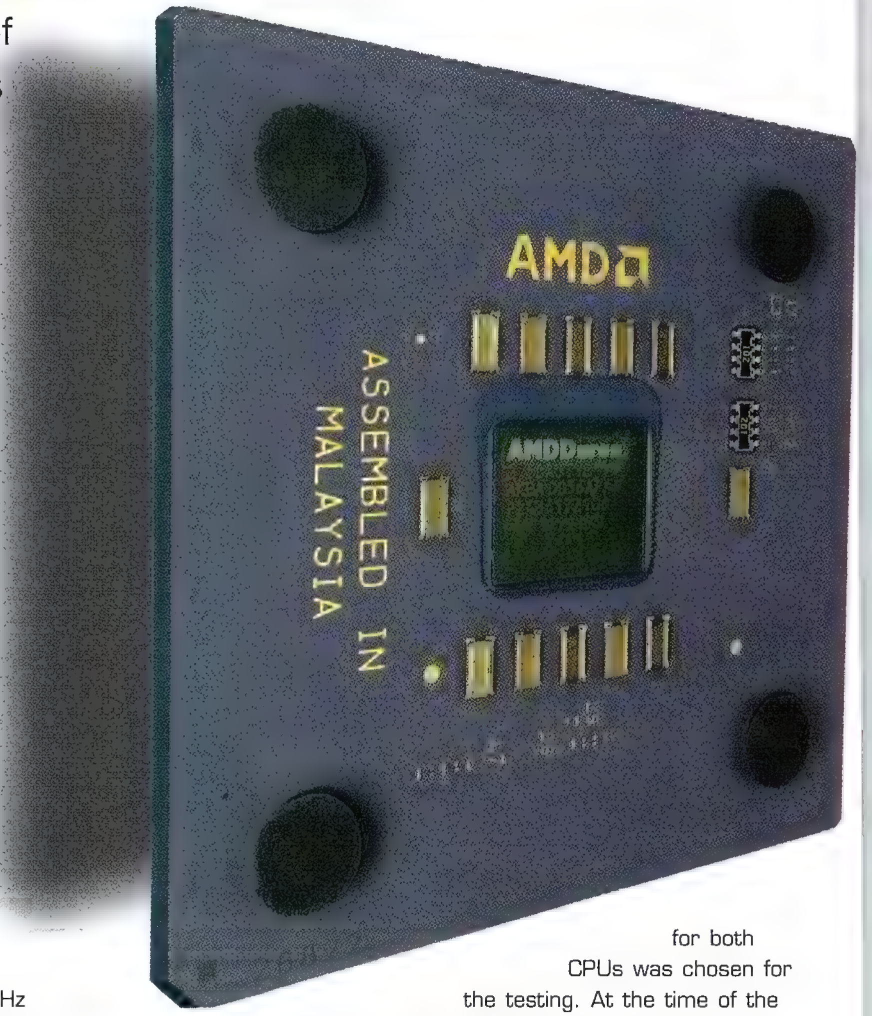
The case is available in three different colours: black, beige and silver. Unfortunately the cases don't come with a power supply unit,

The only thing that stops the Lian-Li case from winning our HOT award is this high price. It is a beautifully engineered case built with the enthusiast in mind, but will probably be a little too pricey for those who are used to spending $100 on a case that includes a PSU. ▢

atomic
8 10

Battle of the

Bennett Ring hits the atomic Labs to finds out which of these budget CPUs packs the most punch...



We present to you the atomic Duron vs Celeron slugfest - an Intel Celeron 667 and a Duron 700 both clocked to 850MHz, going head to head. Both CPUs are closely priced and targeted at the value sector of the PC market, so it is only natural that we compare their performance. Can the Celeron's ageing architecture keep up with the technical innovation of the Duron?

For the benchmarks we used a 66MHz FSB Celeron 667 and a 100MHz FSB Duron 700, both overclocked to 850MHz. By overclocking them both to the same speed, we remove the slight MHz advantage that the 700MHz Duron has at default speed over the 667MHz Celeron. The Duron ran perfectly at 950MHz, but we could only get the Celeron to run stably at 880MHz so a speed of 850MHz for both CPUs was chosen for the testing. At the time of the article Intel had just released their new 100MHz FSB Celeron 800, but these will not be widely available in Australia for some time and Intel were unable to provide one for the tests.

System specifications

	CELERON SYSTEM	DURON SYSTEM
CPU	Celeron 667@850MHz	Duron 700@850MHz
MBoard	Asus CUSL2 BIOS v1004D	Asus A7V BIOS v1003
FSB	66MHz@85MHz	100MHz DDR@100MHz
Mem	128MB PC133 SDRAM@100MHz	128MB PC133 SDRAM@133MHz
Sound	Sound Blaster Live! Player	Sound Blaster Live! Player
Video	Hercules GeForce2	Hercules GeForce2
	with Det6.31	with Det6.31
Drives	Asus 12X DVD-ROM	Asus 12X DVD-ROM
	12GB UDMA 66 HD	12GB UDMA 66 HD
OS	WinME	WinME
	DirectX 7.0a	DirectX 7.0a

Fight!

To get the ball rolling we ran the SiSoft Sandra 2001 Professional CPU test, CPU multimedia test and the system memory benchmark. Whilst the Sandra tests are synthetic, they are useful for targeting specific areas of the CPU and memory system. In the CPU and CPU multimedia tests, both platforms scored very closely, with the Duron edging out the Celeron by a very small amount. We were quite surprised that the Celeron managed to score almost as well as the Duron in these benchmarks, as the Duron is renowned for its powerful floating point performance. But the memory benchmarks told a different tale, with the

Budget CPUs

Duron having 35 per cent more memory bandwidth in relation to integer calculations, and a staggering 46 per cent faster memory bandwidth in relation to floating point calculations.

The Sandra memory benchmark highlights the crucial difference between the two CPUs, that being system memory bandwidth. The Celeron runs on a default FSB of 66MHz, but in our overclocked system this was upped to 85MHz. As a result of the FSB being under 100MHz, we could not run the SDRAM at 133MHz, instead having to settle for 100MHz. Compare this with the double pumped 100MHz FSB of the Duron, which effectively gives the Duron platform a 200MHz FSB. Combine the Duron's blazingly fast FSB with its ability to run the SDRAM at full 133MHz speed and we can see that the Celeron is going to struggle to keep up with the Duron.

The first real-world benchmark to get the budget treatment was Shiny's MDK2, a favourite for testing OpenGL performance. We ran with all details at their lowest and at 320 x 200 resolution with hardware T&L disabled, to ensure that the CPU was the limiting factor in the tests. The Celeron averaged a respectable 85.54fps over 3 iterations of the test, but the Duron won this round with an average of 93.66fps, making it around 9 per cent faster.

Next up was Evolva, which is useful for testing D3D performance. Again the Duron beat the Celeron, although only marginally this time, with an average of 96fps versus the Celeron's 92fps in the non-bumpmapped benchmark. With bumpmapping enabled (a feature that is heavily video card reliant) the two CPUs performed almost identically, with the Duron scoring an average of 53fps compared to the Celeron's 52fps.

> **"...we see a clear performance lead of almost 21 per cent to the Duron!"**

The newest program to join the atomic benchmarking suite is Mercedes Benz Truck Racing. This breathtaking game happens to include a benchmarking feature that makes it ideal for D3D performance testing. It also happened to be the game that highlighted most the performance difference between the two CPUs. Running at the default GeForce settings within the game, with sound enabled, the Celeron scored 65.3fps. Compare this with the Duron's score of 78.8fps and we see a clear performance lead of

≥

almost 21 per cent to the Duron!

What benchmarking article would be complete without the obligatory Q3A test. Not an atomic benchmarking article, that's for sure. No prizes if you guessed the winner here folks; once again the Duron wins by a convincing margin. If you check the graphs below, you'll see the Duron benchmarked approximately 13 per cent faster.

The Q3A tests were done using our new atomic Q3A demo, a much more demanding demo than the included Q3A demos, created using the 1.27g patch. Check our Web site if you want to download it for yourself.

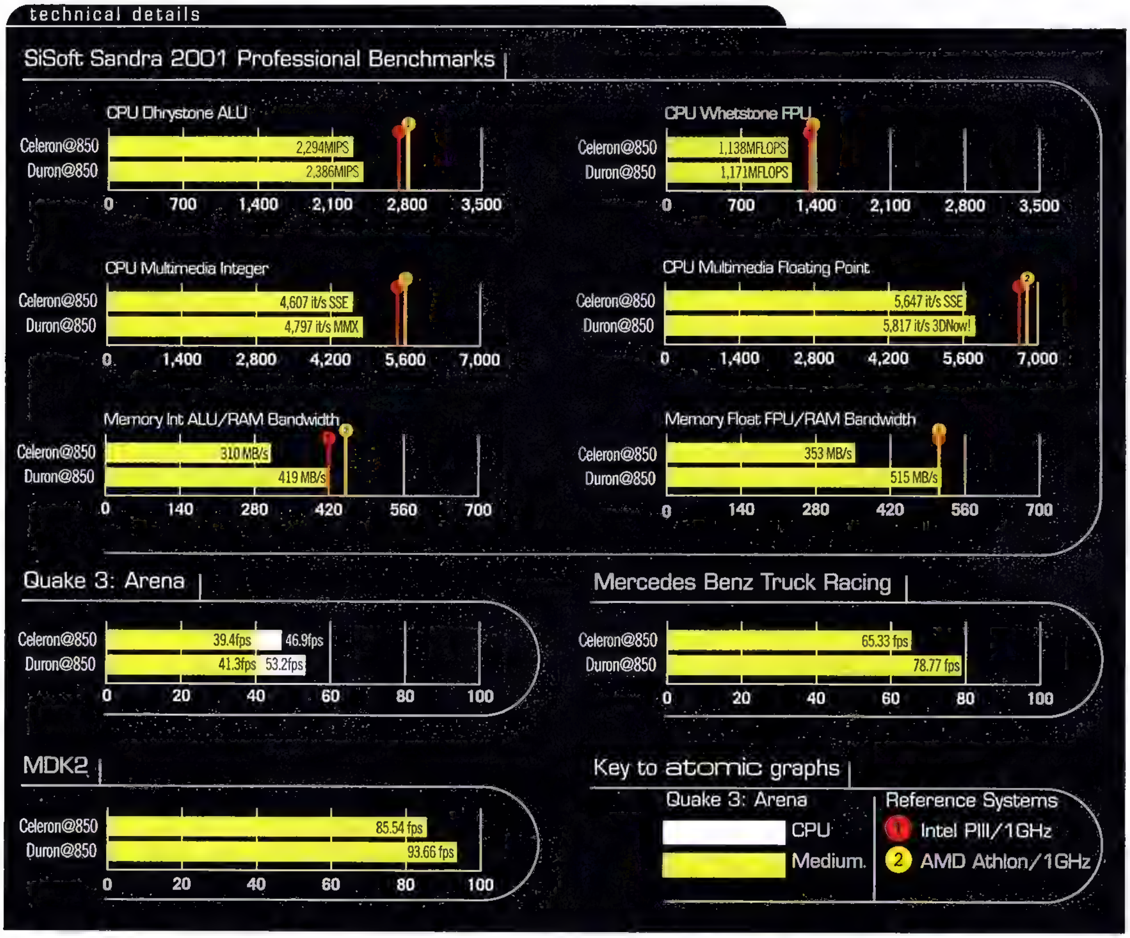
> **"Although the Duron did win this round, it wasn't by such a large margin..."**

As well as Q3A, 3DMark2000 is another staple in the atomic benchmarking diet. Surprise, surprise, the Duron wins this round of the benchmarking once again. We used the Athlon optimisations for the Duron and the PIII optimisations for the Celeron, as these were most appropriate for CPU testing. Although the Duron did win this round, it wasn't by such a large margin, being approximately 7 per cent faster at the lowest resolution of 640 x 480 with 16-bit colour and textures.

At the time this article was written, a Duron 700 was retailing for approximately $187 compared to the Celeron 667 at $214. So not only is the Duron faster than the Celeron in every one of the benchmarks that we ran, it's also approximately $30 cheaper. Which means we have no choice but to announce the Duron as the winner of this head to head. The Duron also successfully overclocks much higher than the Celeron, giving it even more of an advantage. This isn't the final word on the whole Celeron vs Duron debate, as Intel have recently released a 100MHz FSB version of their Celeron CPUs. You can be sure we'll let you know if this increase in FSB saves Intel's stake in the budget market. ▢

The Winner

AMD DURON



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AnandTech.com
October 2000

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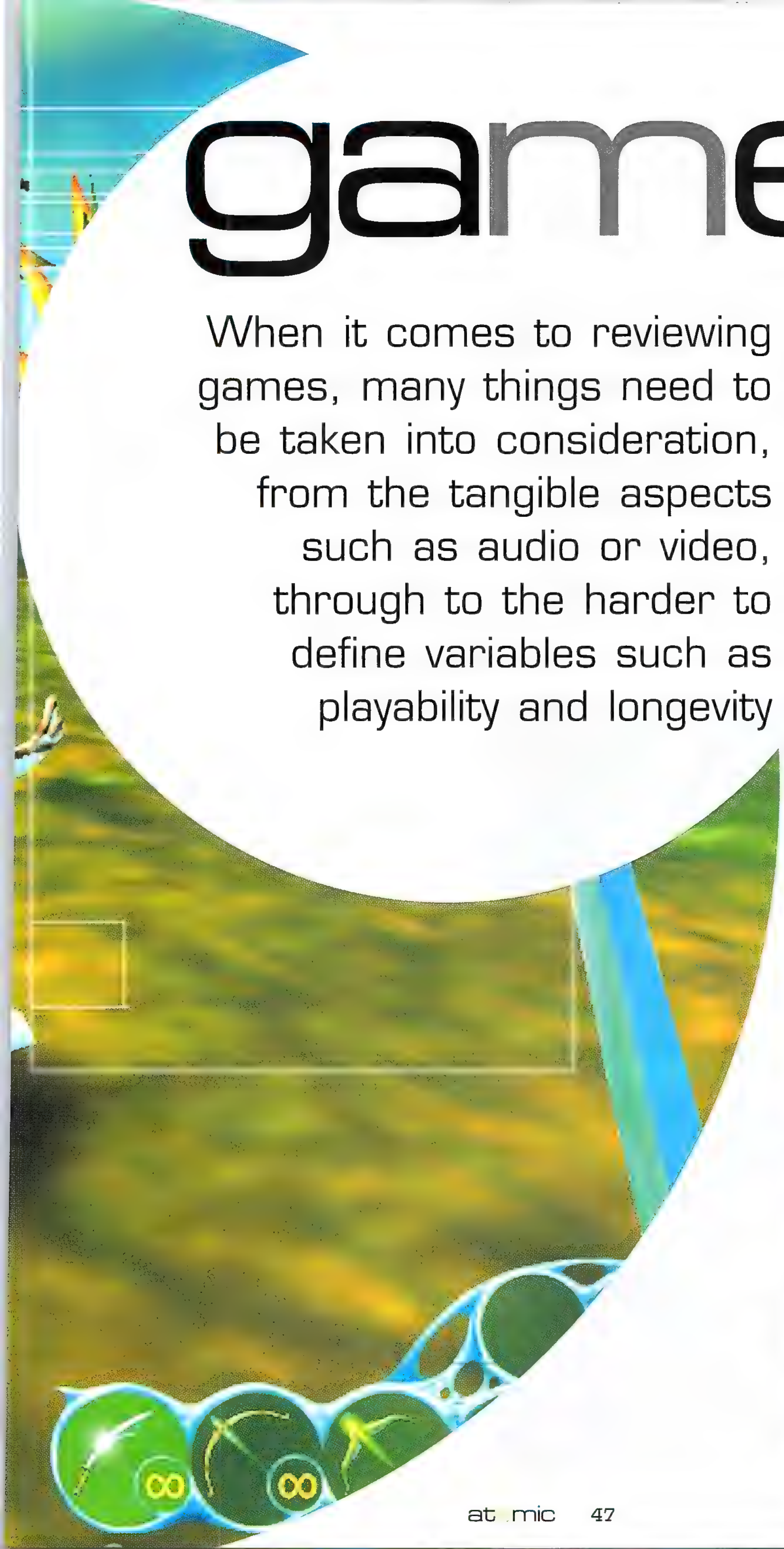


When it comes to reviewing games, many things need to be taken into consideration, from the tangible aspects such as audio or video, through to the harder to define variables such as playability and longevity

But in the end it all boils down to one thing – how good is the game as an overall package for the people it is targeted at, in comparison to what else is available? This is why we don't break our scores up into different areas such as graphics or the like. Sure, if the game has kick-ass visuals it will raise the score, but if it's still a total bore to play, that score will still be low.

So think of our scores as a look at the game as an overall package. The scores are determined by looking at all the important aspects then mashed into one easy to understand number. We at atomic have many years of game reviewing behind us, and came to the conclusion that it's impossible to tell the difference between a 72 per cent game and a 74 per cent game, hence the atomic scoring system where we score in 0.5 increments starting at 0 and rising to 10.

Systems

dc	Sega's canned baby will still have top games, for at least a while...
ps2	Patiently we wait for PS2 to kick in.
pc	Meanwhile, PC continues to rock the hardest for gamers.

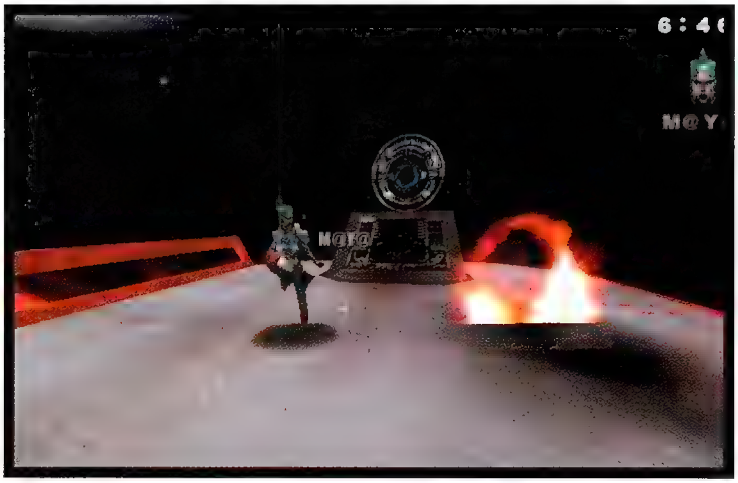
Quake III: Team Arena

id score one for the flag players, according to Justin Kranzl

id Software are the closest thing to gaming-related rockstars in the games development biz. Take a look at some of the past and present staff - engine coding (John Carmack), 3D modelling (Paul Steed), design (Tim Willits, American McGee, John Romero). There is no higher touted 3D games engine currently in existence than the Q3A one. Has this excellence in 3D development been at the expense of current game play trends, such as the increasing emphasis on team play? Given the massive success of Half-Life's Counterstrike mod, it would appear that team play is the 500lb gorilla of FPS gaming - it's impossible to ignore.

The question upon release of Team Arena is...when it comes to teamplay, are these gaming rockstars settling for easy listening, or do they still rock hard?

Ha! You missed!



The invulnerability powerup in action

What's in the box?

Team Arena brings to the table new gametypes, models, powerups, weapons, maps, and a couple of new items. It does not, however, do much to change the visual aspect of Q3A, barring one important exception - that being the introduction of large scale, outdoor maps a-la Tribes. The actual look of the maps however, reflects the original Quake 3 - it's a very mixed bag. A good looking bag, but a mixed one nonetheless.

The new teamplay modes are mainly of novelty value. 1 flag CTF makes players collect the flag from a central point and capture it in the enemy base. Harvester requires the players to collect skulls of the fragged enemy from a central area and deposit them at the enemy base. If you're thinking this sounds quite similar in execution to 1 flag CTF, you're not mistaken. The final new gametype, Overload, asks teams to destroy the enemy base's obelisk (which slowly regenerates health), before the same happens to theirs.

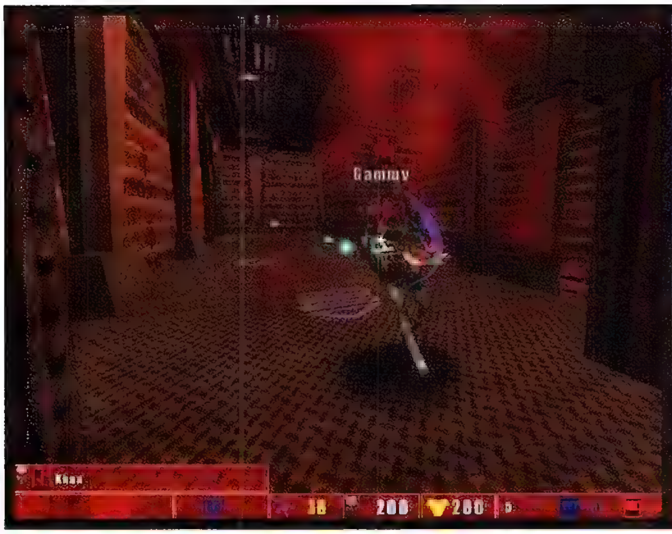
Models are meant to be sexy

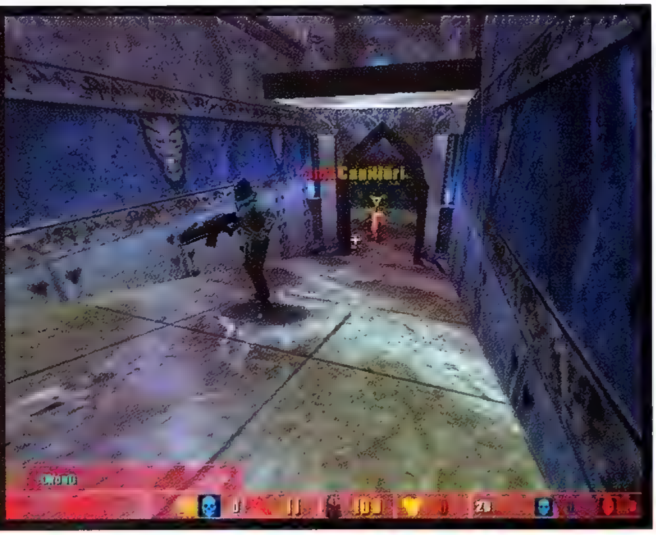
The models are one of the biggest letdowns. Tending towards skinny with the powerup effects inadvertently disguising the model detail, the new models will have most players bemoaning the departure of Paul Steed. Inferior to the original Q3A models in every respect.

The new weapons provide the most interesting addition to the game. The Nailgun, a short to medium range non-hitscan threat, fires a tight cluster of nails at high speed, and takes the longest time to master of the new weapons. The ex-Quake2 Chaingun is pure gaming goodness - find your target (close range is recommended for maximum panic potential), press fire, and hold on! Great for clearing CTF bases and respawned players, although it does chew through ammo like a demon.

The last of the new weapons is the proximity mine launcher. Lovers of cheap frags and spamming will be in heaven. In normal play they are fine - they emit a beeping sound, can be exploded by rockets, and self-explode after 30 seconds. Respawning players don't have a chance, however. Three or four respawns and almost instantaneous deaths from a mined respawn point will frustrate even the calmest gamer.

The bigger maps offer some new scope for teamplayers, making higher team numbers and organisation imperative, requiring Tribes-style





teamplay and Q3A deathmatch ability, the best of both worlds for fans of both styles.

The usual powerup suspects are here: Scout (speed boost), Doubler (double damage, but a pale shadow of quad in intimidation factor), Guard (health regeneration plus armour), and Ammo Regeneration. In addition there are two new items - Kamikaze, which is best described as a human bomb (one for the splashy, suicidal types) and Invulnerability, which encases players in a purple globe - when stationary, the player becomes, you guessed it, invulnerable.

One of the biggest gameplay headaches are that the powerups are so abundant that EVERYONE ends up using one. Worse, they aren't temporary (the Q3A method), lasting until you die. This results in stronger teams being increasingly dominant against weaker teams.

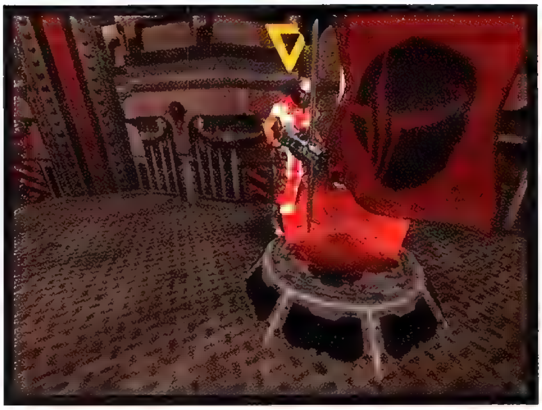
So how does it play?

Team Arena taxes systems more than Q3A. Expect a drop in frame rate. The wispy Team Arena models cause confusion in close quarters fighting. The new maps and weapons will rapidly find a place in each gamers 'most hated/most loved' list - some will love them, some will hate them. Team Arena's match statistics are a good little ego rub at the end of a hard game, but are hardly up to OSP standard.

The sound quality seems to have dropped in Team Arena, and in a wink to UT, those annoying voice taunts are available, most of which will drive players to utter distraction. A goodly amount of guttural and suitably macho voiceover material has been added, enhancing the competitive atmosphere somewhat.

Team Arena is not a must buy for the standard Q3A gamer...unless they are a CTF player. While the ropy models and generic smaller maps will raise a few eyebrows and grumbles, the main issue is that Team Arena offers little that cannot be accessed via a mod download.

If you're a CTF player waiting for a mix of Tribes scope with Q3A deathmatch, this is something you need to buy. For the other teamers out there, adopt a wait and see attitude.



Team Arena still has plenty of corridors to get lost in

Gammy sneezes after being punched in the nose

I have become one with my flag

game details

✓ **Sprawling open terrain maps; increased player capacity; CTF player nirvana**

✗ **Drop in FPS from Q3A; standard maps add nothing new; competing against free products**

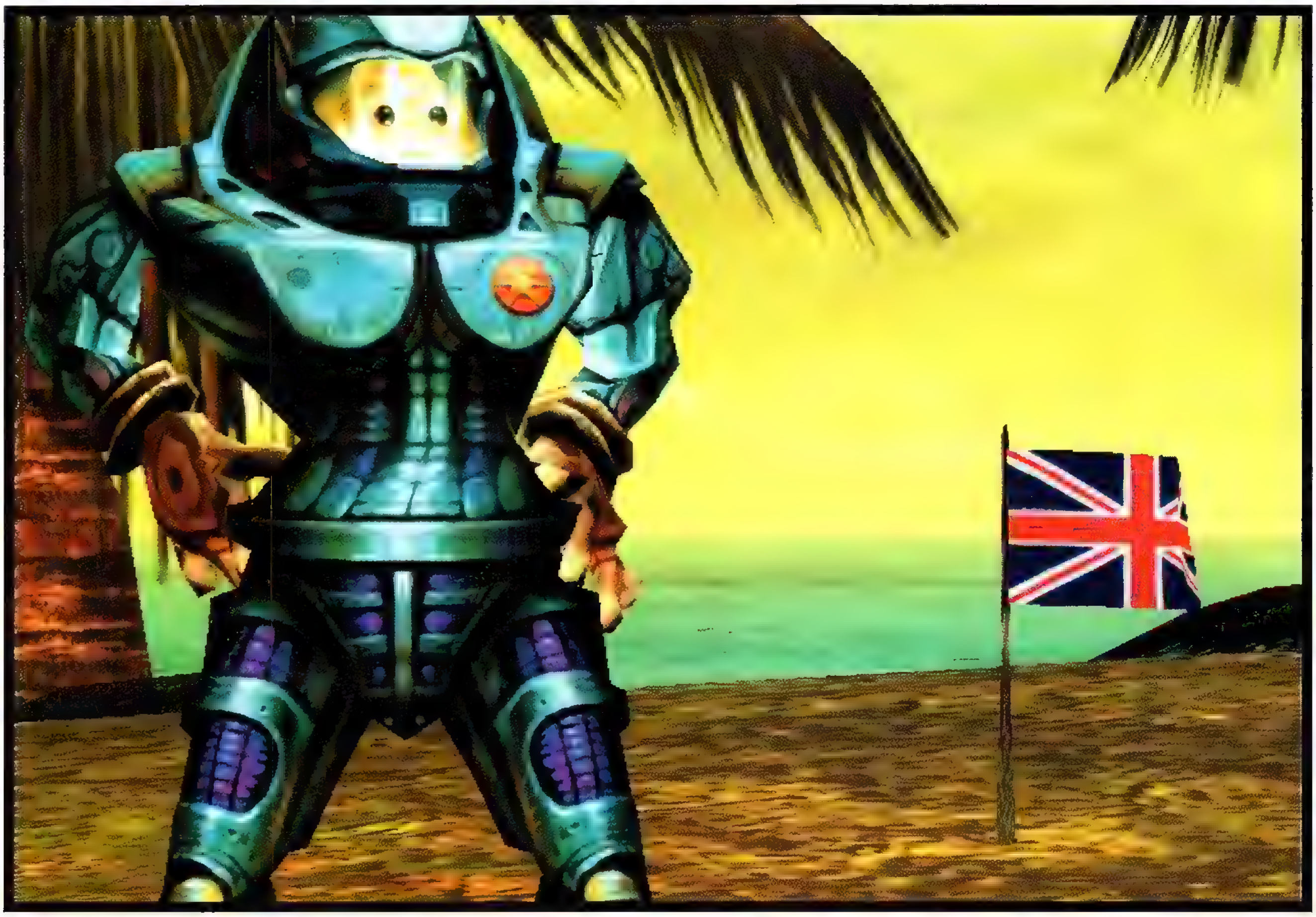
Minimum Requirements: PentiumIII 450 CPU, TNT2 Ultra, 64MB RAM, 400MB HDD
Recommended: 600MHz+ CPU, Geforce256+, 128MB RAM, 800MB HDD
Sound APIs: DirectSound (DirectX 7 or higher required), A3D
Video APIs: OpenGL (GLSetup included on CD ROM)

Developer: id Software www.idsoftware.com
Distributor: Activision www.activision.com

atomic
6/10

GIANTS: Citizen Kabuto

David Kidd puts down his pint and checks out this hotly anticipated game



ⓘ It all begins with some good old-fashioned British imperialism...

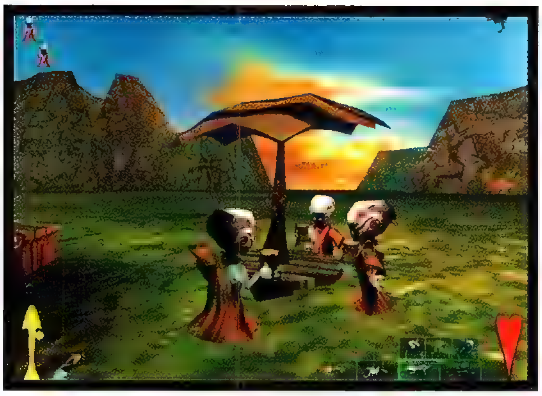
The story behind the much-delayed though highly anticipated Giants goes something like this: a magical asteroid is hurtling through space. Naked blue sorceresses create a big, angry giant. On their way to Planet Majorca, five cockney space marines get stranded on said asteroid. Big angry giant gets angry, naked blue sorceresses get angry and the five cockney space marines would rather go and have a pint.

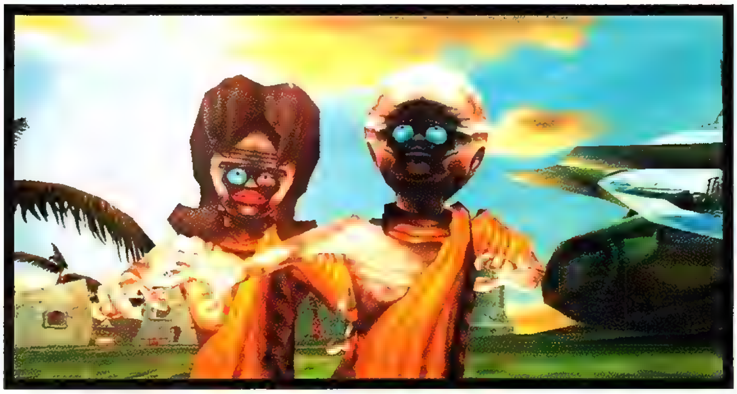
> “Palm trees sway, volcanoes erupt, sun reflects off the water, all in real-time”

Essentially a first/third- person shooter with some base-building elements thrown in, Giants tackles both parts, well average really. Those familiar with first-person shooters will find the controls far too basic to be challenging whilst RTS fans will be insulted by what ‘base-building elements’ means. That said, Giants is extraordinarily fun and the diversity in game-play does not detract from the overall experience.

You begin as Baz, leader of the five marines known as Meccaryns. Each mission has a clear and simple objective and most are thankfully short, and with no in-game save this is a blessing (but more on that later). With the usual assortment of pistols, machine guns, rocket launchers and ‘mini’ nukes most will find the Meccs very familiar and is thus a good place to start. As the story progresses you gain more of your squad mates, who can be assigned basic orders (attack/regroup/defend etc). Getting around the landscape is made easier by the use of personal jetpacks.

Following the Mecc campaign the player gains control of Delphi, a rebellious Sea Reaper who must use her powers to bring down the evil





With a relationship based around domestic violence Giants has its finger on the pulse of today's society

Smarties need a steady supply of beer before they'll even think about working for you.

Queen Sappho. Unlike the Meccs, Delphi must rely on her magical powers. Here, anything from firewalls to teleportation make Delphi's job that little bit easier. In a bizarre plot twist, Delphi is forced to compete in, and win, three 'Reaper-ski' races in order to advance through a campaign that rapidly changes from 'fun and novel' to 'frustrating and tedious'.

Finally the game switches to a young Kabuto. Here you can take part in the growth and maturity of a big blue giant - watch him grow, have kids and learn more destructive methods of hurting others. Kabuto can bite, stomp, jump, sprint, grab and use any number of special 'adrenalinized' attacks. By far the most original take on third-person action ever seen in a game, this is unfortunately left to the end.

Both Delphi and Baz have the ability to build a base. To build structures you must capture Smarties and provide them with food (Meccs) or energy (Delphi). Bases are pre-defined where the only freedom the player gets is in turret placement and various 'portals'.

These missions take place on various islands, which are spectacular to say the least. Palm trees sway, volcanoes erupt, sun reflects off the water, all in real-time. Giants has made fantastic use of hardware T&L (with a special hand from NVIDIA) where tropical, arctic and volcanic environments are represented through intelligent use of colours and effects (lens-flare anyone?).

Imagine Space Invaders with an in-game save and Baldur's Gate 2 without one. Clearly both games would be horrible to play and would not have made it out the door. Giants has a somewhat happy medium by providing short scenarios and an auto-save in between. However if you're like me you'll happily sit on a ridge for hours with a sniper rifle waiting for the perfect kill only to fall into piranha-infested water at the last moment.

Out-of-the-box, Giants has a lot of problems. Bugs have infested the code resulting in unexplained crashes (that's okay I'll just load an old save- damn!) and unexplained invulnerability (okay, so this one isn't that bad). Combined with stare-at-the-wall-while-getting-shot-at AI, Giants feels somewhat unfinished. Furthermore, without an AI skirmish mode replayability is only available to those on a LAN or with a fat Internet connection.

Giants is an ambitious project which has succeeded in creating a gorgeous world filled with humorous and wacky characters. Although marred by bugs and limited replayability, Planet Moon Studios have given us a seamless blend of action and strategy, providing hours of fresh gaming. ▢

game details

✓ Diverse gameplay across three unique races, original and refreshing graphics and cut-scenes.

✗ Linear campaign, no in-game save, bugs. Not the genre busting game everyone hoped for.

Minimum Requirements: Pentium II 350MHz, 128MB RAM, 16MB Direct3D compatible card, 700Mb HDD
Recommended: AMD/PIII 600MHz, GeForce2MX, 128MB RAM, 1.2GB HDD
Sound APIs: DirectSound, EAX
Video APIs: Direct3D

Developer: Planet Moon Studios
www.planetmoon.com
Distributor: Interplay www.interplay.com

atomic
7.5/10

Oni

John Gillooly marvels at Bungie's third person fighting game

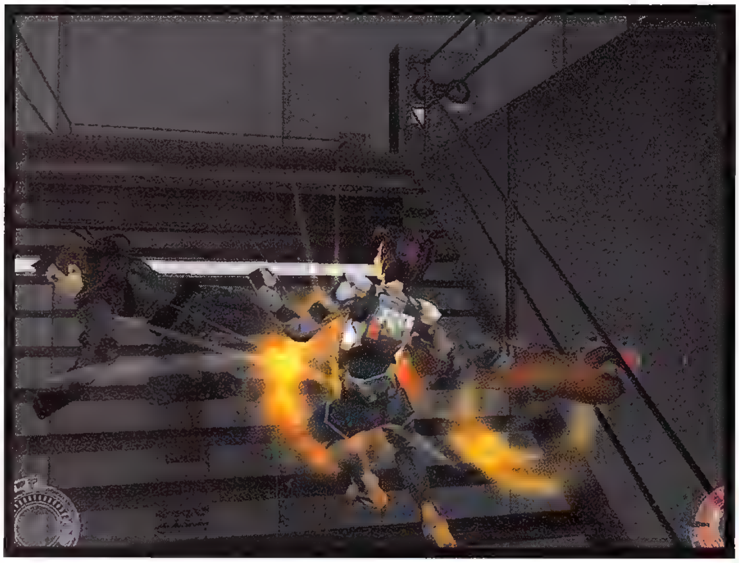
One of the major trends in gaming of late has been a shift to third-person perspective 3D games. Generally this has been let down by poorly implemented control systems and highly simplistic combat. Bungie's latest game, Oni, shows how going back to basics and concentrating development on gameplay and control can create a sublime gaming experience.

Oni translates into English as ghost, demon or "it" (in a game of tag), a theme which permeates the plot of Oni, which in true anime style places you in the shoes of Konoko, member of the elite TCTF SWAT team, loner and one-woman fighting force. As the game develops Konoko is thrown into a spiralling tale of evil conspiracies and questions of identity in which loyalties are tested, all in all a fairly standard Manga plot although without the phallic obsession. There is even a dream sequence in the latter stages of the game.

This anime influence carries across into the graphical style of the game. This is not a game dominated by richly textured and intricate environments, but this is not a function of a poor graphic engine. The game levels are vast and full of subtleties, including some of the nicest breaking glass of recent times. The focus is heavily upon the characters, from the superbly animated and textured Konoko to the variety of enemy soldiers, allies and NPCs.

ⓘ Oni is filled with lush stylised anime imagery.

ⓘ Oni uses flashes of colour to indicate damage when fighting.



"The fluidity of movement has to be seen to be believed"

The fluidity of movement has to be seen to be believed. Konoko is capable of running, jumping, sliding, rolling, cartwheeling, punching, blocking, kicking, throwing and putting hands on hips and throwing out sassy taunts and insults. This is all achieved via an intuitive keyboard/mouse control combination.

Yes, that's right, Oni is a fighting game which uses the well known keyboard and mouse combination for control, rather than a console legacy all-keyboard control system. The camera focuses on Konoko, keeping a locked position behind her at all times and facilitating easy control. A major part of this is that when the camera would normally be blocked, the offending scenery becomes transparent. This is successful most of the time, except on occasions where it can show enemies lurking around the corner.

The difficulty in Oni ramps perfectly. The game starts off with battles against slow single enemies, and before you know it you are fighting multiple enemies. Next thing, enemies start cloaking in mid fight (in a beautiful example of the power of the graphics engine) and showing off a range of Matrix-inspired bursts of speed and movement.

Gameplay Gameplay Gameplay

The fighting controls in Oni achieve that special balance between simplicity and complexity. Using the mouse buttons for punch and kick, combat revolves around movement and the stringing together of combos. Blocking is even more intuitive and done by adjusting the view so Konoko faces enemies square on.

Weapons vary from the stock-standard bullet-based weapons, which are inaccurate at all but close range, to the all-round workhorse plasma rifle to more exotic weapons like the sniper rifle equivalent Mercury Bow and the short range stun gun, the Van De Graph Pistol.

You quickly learn not to rely on the guns in this game, with incredibly limited ammunition the focus is heavily on hand-to-hand combat and frankly, the hand-to-hand combat in Oni is much more fun than gunplay. The guns are of concern more from a defensive standpoint, making sure you avoid the barrage of ordinance being directed at you not from you. There are even special moves designed purely to disarm particularly nasty enemies.

The enemy AI is good where it counts, in the heat of battle enemies show no mercy and will use any means available to bring you down. When fighting against multiple enemies they attack from different angles, sometimes run away or try to flank Konoko and even grab dropped guns and start blasting away. Situational awareness is an important factor in the game.

The corollary to this is that, on some of the levels, Konoko either has one or two TCTF members as backup, or comes across friendly security guards along the way. These friendly characters will team up and help Konoko fight her way through the level. Konoko is also rewarded for helping out innocent civilians, when rescued they will often give extra ammunition clips or health-restoring hypos.

Another thing that deserves a special mention is the sound. From the satisfying thuds and thumps resulting from punches and kicks being landed, to the cracks and crunches associated with throws, the combat sounds are beyond par.

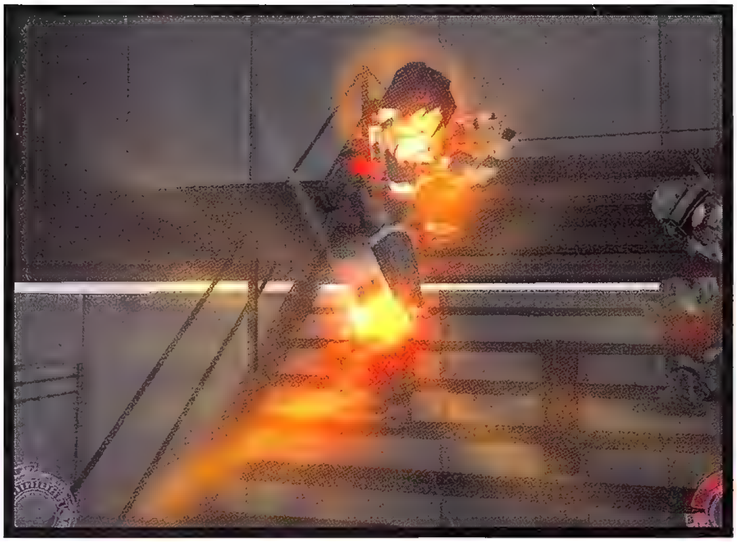
Nothing is perfect

Oni, in a trend that is increasing as games are developed simultaneously for PC and console, has no in-game save. Unlike some recent releases this does not detract from the gameplay, with autosaves occurring at key intervals midway through each level.

Several aspects of the interface are also worrying. In order to change game options you have to quit the game completely and then restart it. There is also no way of rebinding keys in game, however there is a file named key_config.txt in the install directory which you can open in a text editor and rebind the keys (which default to the pseudo-standard WASD movement configuration).

Oni contains no multiplayer aspect, which is a disappointment but by no means detracts from the game. I have horrible visions of the latency issues that could crop up with trying to play this sort of fighting game over the Internet, and the care taken with developing the single player experience is more than sufficient to negate the lack of multiplayer support.

There is one final word of warning. There are occasional outbreaks of jumping puzzles in Oni. There are also a few "jump and duck the laserbeam" momoents. While these are only occasional, they can still be mildly frustrating in the short term, but do not provide too much of a barrier to progression.



ⓘ Will this staircase never cease.

"The fighting controls in Oni achieve that special balance between simplicity and complexity"

Few PC game concepts inspire fear like a third-person perspective fighting game with no in game save. Bungie are a company that are renowned for their immeasurable contribution to the first person shooter and real time strategy genres with Marathon and Myth. With Oni they take a genre bogged down with the repetitive jumping puzzles and mundane gunplay of Tomb Raider and its ilk, showing how it should be done by focusing on action and a good quality control system. Oni is a fun, easy to get into game, which still provides a challenge, something becoming all too rare in the current gaming environment. ▢

game details

✓ **Intuitive control system, Great gameplay, smooth character animation, Great gameplay**

✗ **No in-game save, confusing menus**

Minimum Requirements: 266MHz processor, 64MB RAM, 800MB HDD, 3D accelerator
Recommended: 500MHz processor, 64MB RAM, 800MB HDD, 32MB 3D Accelerator
Sound APIs: xxxxxxxxxx
Video APIs: OpenGL
Multiplayer: None

Developer: Bungie www.bungie.com
Distributor: Jack Of All Games

atomic
9/10

Project IGI

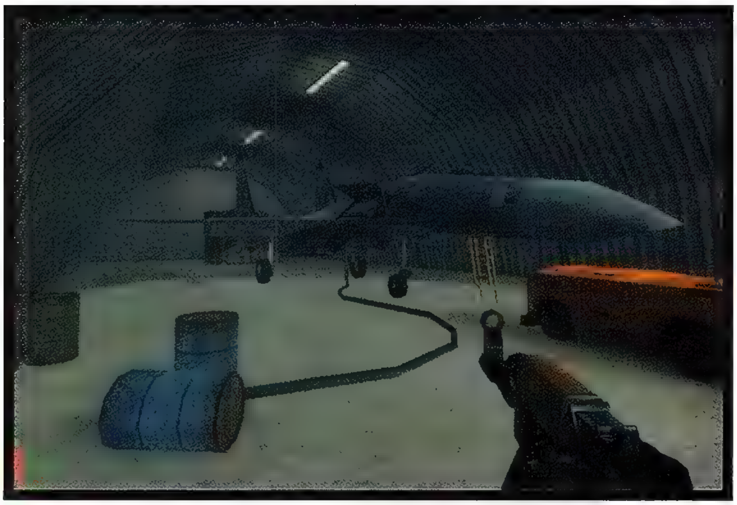
Bennett Ring screams “I’m going in”, lays down some suppressive fire and rushes headfirst into this realistic FPS

Realistic FPS (First Person Shooters) are few and far between. In the past the vast majority of FPS games have had a distinctly sci-fi feel to them but with the amazing success of Counterstrike in the online world this trend is set to be shattered. First off the ranks in the upcoming wave of realistic FPS clones is Project IGI.

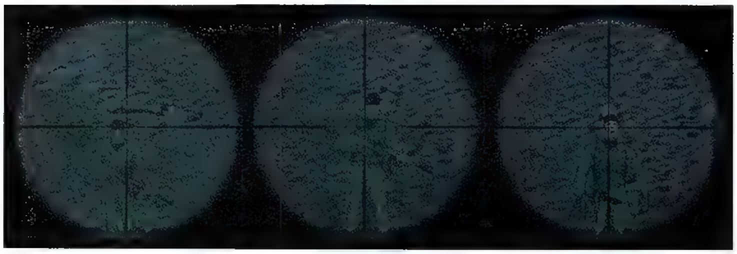
Project IGI sees the player controlling an ex-SAS soldier by the incredibly original name of David Jones. It is Jones’ job to single-handedly take on an entire army of Estonian soldiers in his quest to rescue a certain Joseph Priboi. Which leads us to ask, if this is supposedly a realistic game, why the hell are they sending one man to do the job of a dedicated Special Forces team?

The graphics engine in use is an adapted version of Joint Strike Fighter’s engine. Initially this seems like an odd choice, but the immense open-air levels prove it wasn’t such a strange decision. Some of the levels start with you positioned in mountain ranges above the complex you are to enter, and the sheer size of the vista below you is most impressive. In fact, I’d go as far as to say that Project IGI has the largest and most impressive open-air levels yet seen in a FPS. Unfortunately from here it all goes downhill at a near vertical slope.

ⓘ The vehicle modelling is superb for a FPS



ⓘ Anatomy of a headshot . . zoom, aim, boom.



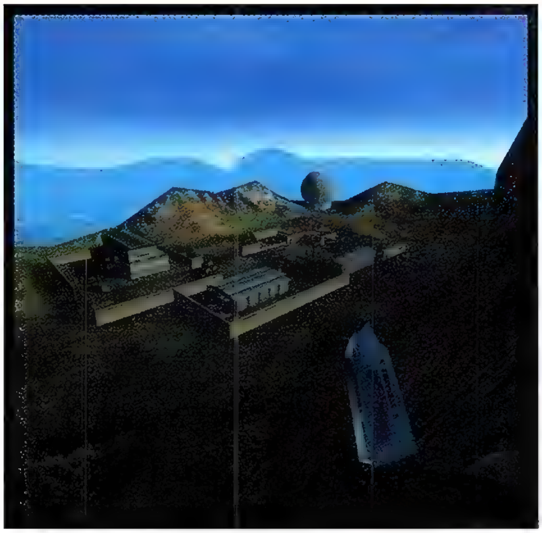
Whilst the terrain graphics are mouth watering, the actual characters that populate these levels are dull and boring to say the least. I can understand the artist’s need to keep to a low polygon count due to the wide open spaces, but this doesn’t mean the models should look like slightly beefed up stick people. Movement of the characters is quite attractive, but there simply aren’t enough animations to stave off repetition. To top it off, there doesn’t seem to be much variety in the different enemy types.

Atmospheric effects are done well within Project IGI, but the same can’t be said about the structures. Buildings look fine from the outside, but once entered you will soon start to wonder if the game actually takes place on a Hollywood movie set, due to the interiors utter lack of detail or furnishings. There is the occasional desk and PC sprinkled throughout some of the rooms, but this isn’t enough to give each building its own distinct identity.

For this game to succeed strong enemy AI was a necessity. Alas, Project IGI doesn’t even have average AI, and it is this weakness that really drags the game down. The manual states that stealth is required to get past the guards on duty, and opening fire with loud weapons will bring the bad guys running. After encountering your first few enemies, you will realise that the manual writer must have been playing a different game.

> “Alas, Project IGI doesn’t even have average AI, and it is this weakness that really drags the game down.”

Due to the large levels, you will nearly always spot an enemy long before they see you. Their field of vision seems to be limited to anything that is within 50 metres directly in front of them. At times even this is generous as occasionally you will be right next to a guard and they won’t notice. If one guard does go down within the sight of another, the surviving guard won’t react at all.



ⓘ The camera switches to an external view for some actions

ⓘ Huge, open maps are this games strongest point

Occasionally an alarm will be set off, but this is a rare occurrence. The realism is also shattered when a room you have recently cleared spawns fresh enemies who then rush from its one and only entrance.

Generally, if you are spotted, the guards will all charge at you along the same route, enabling you to easily cut them down with one clip from your AK-47. Sometimes they drop to the ground to present a smaller target, but as soon as they have hit the ground they start to get back up again, making them easy to hit as they go through this bizarre AI routine.

This doesn't mean Project IGI is an easy game. The guards shoot as if they are all expert snipers, easily hitting you from ranges that you have little chance of hitting them from, even when you are both equipped with identical weaponry. Combine this with the absence of an ingame save feature and Project IGI quickly degenerates into a game of intense frustration. Some of the larger levels can take up to 30 minutes to complete, so having to start them from scratch every time you die, due to this lack of an ingame save, proves to be incredibly tiresome.

A modern arsenal

A highlight of the game is the variety of weapons on offer, encompassing a decent variety of modern firearms. Rocket launchers are also included, which come in very handy for the several vehicles that the enemies can control. These vehicles range from APCs through to helicopters and help to spice up this otherwise dull experience.

While there are a nice range of weapons to use, even these have severe problems. For example, the default MP5 submachine gun comes with a zoom feature, making it much more accurate at long ranges than the AK-47 which can be picked up from dead enemies. Since when did a submachine gun have a longer range than an assault rifle?

These faults might all be forgivable if the multiplayer support was sound, but amazingly Project IGI HAS NO MULTIPLAYER SUPPORT AT ALL! With such huge,open areas to battle in, the multiplayer aspect of Project IGI could have been revolutionary yet the developers saw fit to leave this mode of play out. This is totally unacceptable in any FPS that has been released in the last couple of years, let alone 2001.

Project IGI would have been better titled Project IGA (I'm Getting Angry). While fun for the first few levels, the lack of an ingame save feature and its poor AI kill what promised to be an interesting game. Let's hope that Project IGI isn't indicative of the quality of the rest of the upcoming batch of realistic FPS.

game details

✓ **Huge open levels**

☒ **Everything else**

Minimum Requirements: 300MHz CPU, 64MB RAM, Dx7 compatible video card, Dx7 compatible sound card, 500MB HD space

Recommended: 700MHz CPU, 128MB RAM, GeForce256, Dx7 compatible sound card, 500MB HD space

Sound APIs: DirectSound

Video APIs: Direct 3D

Multiplayer: NO SUPPORT!

Developer: Interloop Studios www.interloop.com

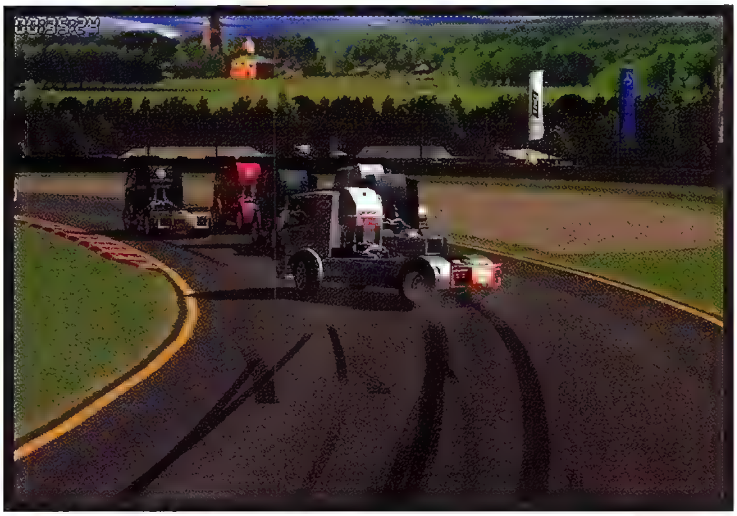
Distributor: Ozisoft www.ozisoft.com.au

atomic

6.5/10

Mercedes Benz Truck Racing

"Trucks aren't just for moving furniture", reports Bennett Ring



ⓘ Screenshots can't do justice to the level of detail present.

Imagine eight 4-tonne slabs of butter tearing around a 4km track of polished wood using rockets for propulsion and you've got a rough idea of what the racing in MBTR (Mercedes Benz Truck Racing) is like. You might not have thought that trucks were the ideal racing platform, however the unique driving in MBTR will make you wonder why no one has created a truckin' good sim earlier.

The first thing to impress is the advanced graphics engine. The trucks are rendered to a high level of detail and use high resolution textures. Particle and lighting effects, as well as some over the top reflective effects, help to give the trucks a disturbingly realistic look. The tracks are rendered just as nicely, with many trackside objects and a far reaching horizon point, but it does all come at a price.

You will need a mega-PC to get the most out of this title, we're talking at least a 700MHz CPU coupled with a GeForce 2 folks. In fact it's so demanding that we've decided to use it as one of our atomic benchmarks. Thankfully it is highly configurable for lower speed machines, enabling smoother frame rates at the cost of some eye candy.

The handling in MBTR can be summed up with one word – superb. Initially these rolling powerhouses are seemingly impossible to control, requiring extremely cautious use of the accelerator to tame the tail end. Due to the massive amounts of inertia each truck possesses, use of the brakes is imperative in even the gentlest of corners. But after several hours of continual losses and humiliating crashes, you will start to become one with your truck and its merciless physics, sweeping around corners and through chicanes in a manner that would make any truckie proud.

The driver AI is fiendishly difficult to beat on the higher difficulty settings, making the option to lower their IQ very welcome after having my butt continually kicked. I soon had them set to a driving level similar to my own, resulting in some of the tightest racing I've ever had in a single player sim.

All of the standard racing game options, from tweaking your truck in the garage, to racing a full championship campaign, are presented via a tidy, easy to navigate interface.

Multiplayer support is crucial in the racing genre, but it is this aspect of the game that is severely lacking. Joining from a 56k modem to a cable connection, severe warping and stuttering of my opponent was observed, when it wasn't crashing to the desktop. This shocking multiplayer support cost MBTR our coveted HOT award.

MBTR takes the racing genre to new heights with its amazing graphics and intricate physics engine. Backed up by solid opponent AI, MBTR is an all round quality title that does justice to the Mercedes Benz license. Casual racing fans may not appreciate the slighlty slower pace of truck racing, but for the hardcore drivers out there this is a racer you shouldn't miss.

game details

✓ **Advanced Graphics engine, intricate physics engine, unique style of racing.**

✗ **Not for the casual racing fans, high system requirements.**

Minimum Requirements: 500MHz CPU, 128MB RAM, GeForce 1, 443MB Hard Drive space, DirectSound compatible sound card

Recommended: 700MHz or greater CPU, 256MB RAM, 64MB GeForce 2, 443 MB Hard Drive space, DirectSound compatible sound card, Force Feedback steering wheel

Sound APIs: Direct Sound

Video APIs: D3D

Multiplayer: 8 player (using 1 CD!) using IPX, TCP/IP, serial (2 players)

Developer: Synetic www.synetic.de

Distributor: THQ www.thq.co.uk

atomic

8/10

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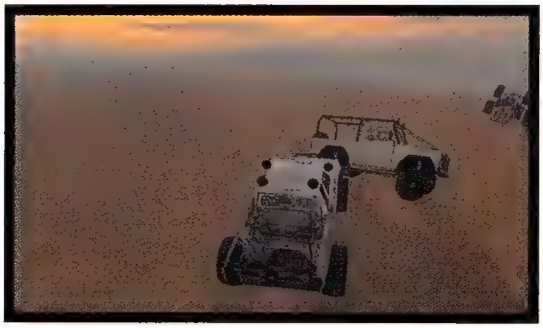
1NSANE

John Gillooly gets insane in the roadtrain, insane is *the* game

ⓘ Remember Big Red Racing? Super network game, that. 1nsane is the same mad arcade fun

1nsane is a strange beast. Part motocross madness, part rally game, with gameplay inspired by the current crop of first person shooters. Codemasters have managed to meld these into a highly enjoyable and very different game.

The gameplay in 1nsane revolves around offroad racing in a wide range of vehicles, from dune buggies and pickups to lumbering 8 wheel drive trucks, rally cars and even a Quad bike. These vehicles are modelled beautifully, when you change gears, so does the driver, when you plow head first into a wall the car buckles, roll it and the roo-shooter spotlights on the roof snap off.



ⓘ I wanna be a Humvee when I grow up. Just like John Romeros. Yum yum. Killcreek can sit on my leather any day

The playgrounds for these cars are wide expanses, each with its own theme, including the Pyramid dotted deserts of Egypt and the icy ravines of Wales, each landscape contains its own unique look that is backed up by impressive physics modelling. Each vehicle handles differently, as does each terrain type, giving a highly realistic feel to the driving model. The pre-made maps are extended through a terrain generator, which is unlocked upon completion of the game, allowing almost unlimited environments for play. 1nsane is only partly about traditional car racing. There are various game modes, mostly focused around beating your opponent to gates dotted across the map. One of the most enjoyable modes is Capture The Flag, in which the objective is to pick up a flag and keep it out of the hands of your opponents, flying along, weaving left and right, all the time trying to keep your vehicle upright and out of a ditch.

This is a game designed to be a multiplayer blast, single player is fun for a while, with the AI cars performing admirably, but this is a game that really shines with a few mates bumping and bashing each other in a desperate dash for the next gate, or to grab that flag. The physics model is conducive to some really fantastic chases, which need not be high speed to be frantic.Online play is unfortunately restricted to the Codemasters online network, with potential latency problems for us antipodean gamers.

A truly unique game, 1nsane is perfect for a quick distraction or hours of multiplayer fun. The simplicity of the game modes belies the complexity of the driving model; this is a game where mastery takes time. The major downside is that because the game modes are so simple they may not have enough grab for long term replayability. ▢

atomic
8/10

game details

✓ **Impressive physics engine, different take on racing games, great multiplay blast**

✗ **Proprietary online multiplay network, doubtful longevity**

Minimum Requirements: 233MHz CPU, 64MB RAM, 3D graphics card, 126MB HDD
Recommended: 500MHz CPU, 128MB RAM, 32MB 3D graphics card, Cable Internet Connection, 578MB HDD
Sound APIs: Direct Sound
Video APIs: Direct 3D
Multiplayer: TCP/IP and IPX LAN play, online via Codemasters Multiplay Network

Developer: Invictus www.invictus.hu
Distributor: Ozisoft www.ozisoft.com.au

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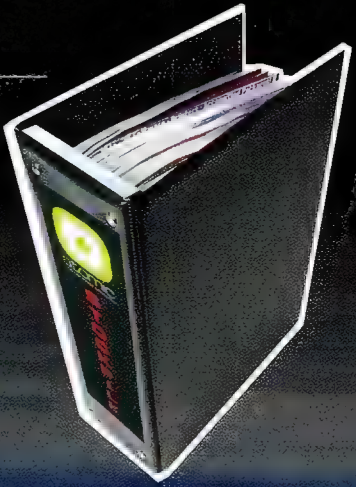

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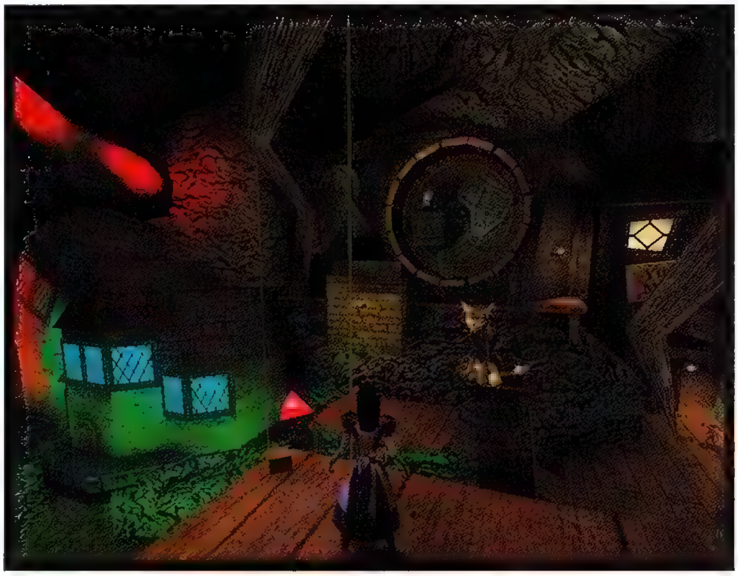
American McGee's Alice

Bennett Ring takes a little trip to a town called Alice



ⓘ Alice, Alice, it's too dark to see Alice!

ⓘ This is what will happen to you after prolonged exposure to atomic...

The Quake 3 engine is one of the prettiest 3D engines available to developers, as well as being one of the most powerful. American McGee's Alice is the latest game to use this luscious engine, but can its gameplay come close to the mouth-watering visuals on offer?

It is immediately apparent that American McGee's Alice is a fairytale that is definitely not for children. From the psychotic Cheshire Cat through to the mind-numbingly bizarre environments, the inspiration of the artists seems to stem from a limitless supply of high strength LSD mixed with large doses of evil.

Style over susbstance

The Quake 3 Arena engine effortlessly renders the amazing scenes within Alice, using a multitude of lighting and transparency effects. Especially worthy of mention are the absolutely twisted levels, being more reminiscent of a bad dream than a child's story, as well as the amazingly realistic water effects. Alice and her cronies are all animated beautifully, although there are some slight clipping problems that become particularly apparent during the many in-game cut scenes.

So Alice is definitely a looker, but what is she like to play with? For a third person platformer Alice controls well, responding accurately to any player input. Which is most helpful considering the amount of jumping to be done.

The enemies to crush and destroy along the way all seem to have the IQ of a carrot. End of level bosses are also included, that while being visually impressive still rely on the old routine of "get your butt whipped by Mr Big until you find out the one weakness in his AI" routine.

When she isn't hurling flaming cards at imbecilic giant ants, you'll most likely find Alice jumping on something. Alice is first and foremost a 3D platformer, unfortunately the vast majority of the problems within the game could easily be solved by a child attending pre-primary. There wasn't a single problem I encountered that wasn't solved almost immediately, leaving me with plenty of time to jump, jump and occasionally jump a little more. When will developers realise most people hate jumping sequences!

Alice's soundtrack is the eeriest piece of game music to be released in a long time. Composed by Chris Venna, a founding member of Nine Inch Nails, Alice's soundtrack shows just how much music can add to a game.

Visually and audibly, Alice is easily up there with the best of them. But when it comes to playability, the weak AI, overly-simple puzzles, abundance of jumping scenes and linear level design shatter the illusion that Alice is anything more than a basic platformer. Whilst initially enjoyable, Alice soon degrades into a shallow and unfullfilling 3D jumping experience.

game details

✓ **A monument to graphical greatness; mood provoking music and sound effects; unique twist on the Alice story.**

✗ **Jumping; simple puzzles; jumping; pathetic enemy AI; jumping.**

Minimum Requirements: 400+MHz CPU, 16MB OpenGL / DX7, compatible video card, DX7 compatible sound card, 64MB RAM, 580MB HD space
Recommended: 600+MHz CPU, 32MB GeForce256, DX7 compatible sound card, 128MB RAM, 580MB HD space
Sound APIs: DirectSound
Video APIs: D3D

Developer: ROGUE Entertainment
www.rogue-ent.com
Distributor: EA www.ea.com

atomic
7/10

Shenmue

Kevin Cheung explores Sega's flagship RPG for the Dreamcast

ⓘ Shenmue is a graphical masterpiece, extracting an unsurpassed level of performance from the Dreamcast.

This is the big one, ladies and gentlemen, the one that Sega has long touted as its flagship title, and the one that would supposedly legitimise the career of prolific game developer, Yu Suzuki. Shenmue is an epic role-playing game the likes of which console gamers have never experienced. The ideas are fresh, the execution unique, and it gives the PlayStation 2 a good run for its money.

Ryo Hazuki is a brazen young Japanese lad who witnesses the murder of his father at the hands of a Chinese martial artist, Lan Di. Despite the dark suits and dark cars that scream "you're out of your league, kid", Ryo vows to exact some good old-fashioned vengeance on his father's killers. This decision puts Ryo on an adventure spanning several chapters – this first chapter taking place entirely in the port city of Yokosuka, filling not one, not two, but three whopping GD-ROMs.

The mean streets of Yokosuka

Viewed from a third person perspective, players must navigate Ryo through the streets of Yokosuka, undertaking to the predictable routine of fact-finding and discerning the next point of contact that should be made to progress further. This basically means there's lots of talking. Lots. Every character Ryo encounters has a voice-acted speaking role, bringing out the diversity and personality of the local community.

This takes a back seat to Shenmue's more obvious strength: raw graphical beauty. Shenmue is without doubt the most technically impressive showcase of the Dreamcast's graphical power. Everything in this virtualised Yokosuka has been painstakingly sculpted and textured to create a complete three-dimensional world. Ryo can freely look around to admire the buildings, street signage and cars; even the trees have an intricate network of branches that reach into the sky.

At a more minute level, Ryo can open garbage cans, ring doorbells, buy a can of Coke from a vending machine, switch on a desk lamp…if there's anything you can imagine doing in real life, you can probably do it in the game.

Taken together, the story, exploration, atmosphere, action scenes, and enormous detail adds up to one of the most complete role-playing experiences ever. However, that doesn't necessarily make it a good one. In isolation, the features are incredible, but in the context of the main story, they are largely irrelevant. There's no need to feed the kitten, drink cans of Coke, or play Hang On at the arcades. If you follow the steps like clockwork and concentrate on avenging Ryo's father, the game will be over quite quickly.

Still, that takes nothing from Shenmue's technical beauty, which is frankly overwhelming. One can only hope that Yu Suzuki will take the criticisms in stride and improve the quality and pace of his storytelling in Shenmue's next chapters.

game details

✓ **The comprehensive visual detail must be seen to be believed.**

✗ **Too many sub-games and activities that are irrelevant to the plot.**

Minimum Requirements: Dreamcast, control pad
Recommended: As above, plus VM Unit

Developer: Sega www.sega.co.jp
Distributor: Ozisoft (02) 8303 6800

atomic
8.5/10

atomic HOT

Time Splitters

Kevin Cheung first-person shoots with a control pad. No, really

As a general rule, console-based first person shooters suck. But Time Splitters is being made an exception because it strikes a decent middle ground, incorporating some of the control principles used in PC-based shooters whilst still retaining the flair and excitement required to make a console game fun. The end result, surprisingly, remains one of the best games available in the PlayStation 2's software library.

The story behind Time Splitters defies description, as there is none. This is 100% pure deathmatch-mania, with a healthy dose of teamplay modes like Capture The Flag (or Bag, as it's called here) and Escort. Hook up a PS2 Multitap, invite three friends over, and you might as well write off the whole evening.

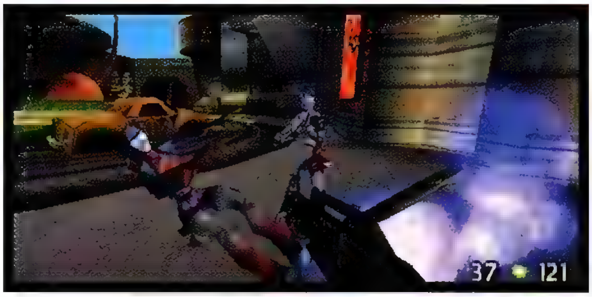
The reason for the name "Time Splitters" is that the characters come from several different time periods spanning between 1935 and 2035. Our eclectic band of protagonists range from pinstriped Chicago mobsters and SWAT specialists to Egyptian priests and laser-toting space cadets. But why stop at non-fiction? Time Splitters also features zombies, cyborgs, and a little robot powered by a fish in a bowl.

Control is as literal an analogy of the keyboard/mouse interface as a control pad can get. Anything that would otherwise be done by the mouse is relegated to the right hand, so the right analogue thumbstick is for looking around, and the two right shoulder buttons are for primary and secondary fire. The left analogue stick is used for strafing and running; the left shoulders for crouching and bringing up the target reticle; and the D-pad is for switching between weapons. Sorry folks, no jumps. It takes a little getting used to but this interface works out smoothly and intuitively.

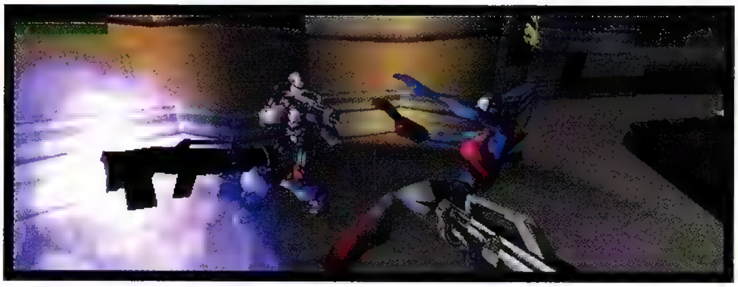
The graphical component is likely to cause the most controversy, since the in-game textures exhibit many of the flickering and resolution issues that have plagued the PlayStation 2. Flat objects in the background are prone to the moiré effect, and if you run to anything up close, it just doesn't compare to the kind of high detail you get in Q3A or Unreal Tournament.

It still looks quite reasonable to the untrained eye, but the big technical trade-off is speed. This game runs like a demon, doing the full 60 frames per second without breaking a step. The action is absolutely furious, and the bots are unforgiving enough to ensure that any newbie who stops to admire the scenery is pasted within a millisecond. It gets better, though. Players can hold weapons like the minigun and double-barrelled shotgun in each hand, which is positively lethal just for the amount of ricochet.

The coup de grâce is a brilliant little map editor that provides an indefinite long-term appeal. After a bit of learning and experimenting, you'll be able to create massive multi-level arenas with traps, ramps, and fully customisable lighting, weapon placements and spawn points. Unfortunately these options become limited with time, and we can only hope that the sequel will offer more.



ⓘ Multiplayer Deathmatch mayhem is something not usually associated with console gaming



ⓘ Same action, different perspective. Taking "looking at the other guy's screen" out of the LAN and into your living room.

atomic 9/10

game details

✓ **Fast, social, and extremely addictive to play, the Map Editor, while limited, is extremely well designed**

✗ **Low texture detail can make characters look indistinguishable in the distance, story mode is redundant**

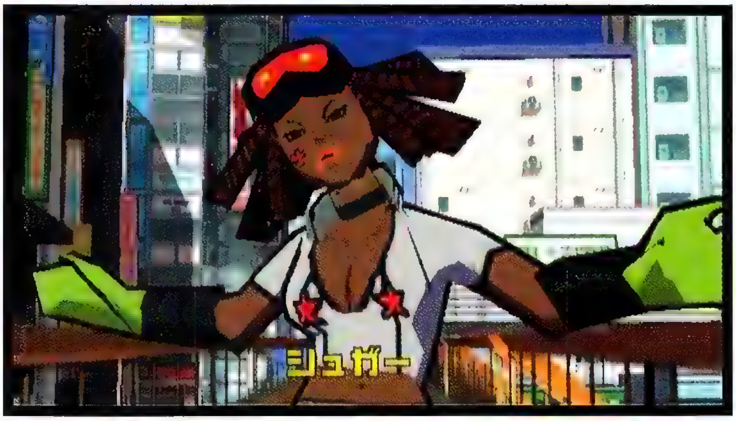
Minimum Requirements: Dual Shock 2, 8MB Memory Card

Recommended: As above, plus PS2 Multitap

Developer: Free Radical Design
www.freeradicaldesign.com
Distributor: Ozisoft (02) 8303 6800

Jet Set Radio

Kevin Cheung grabs his spraycan and engages in some digital anarchy



Jet Set Radio uses cel-shading to give the game a unique stylised look and feel.

Don't let the psychedelic eye-candy fool you. Jet Set Radio is best thought of as Sonic The Hedgehog meets Tony Hawk, celebrating rebellion and social dysfunction through the aerosol stroke of a spray can.

Players assume the role of a pre-pubescent misfit who stalks the streets in his battery-powered rollerblades. His gang controls the fictitious inner city hub called Tokyo-to, where the political boundaries with other districts are put under threat by rival gangs. Outsiders are spreading their filth by leaving tags on our walls, and it's up to us to reclaim these areas by spraying our tags over them.

Spray and Prey

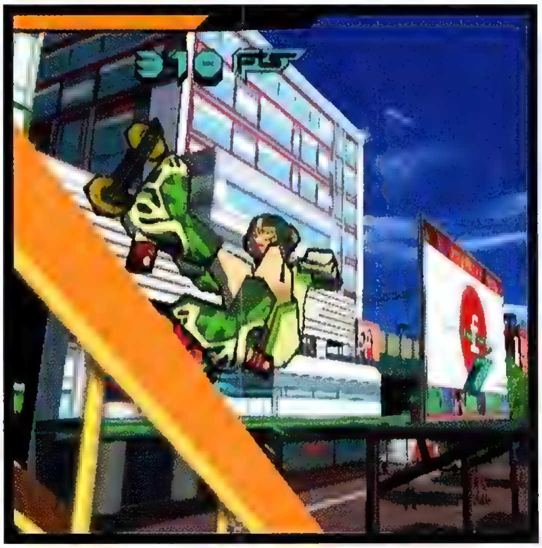
But what of the poor upstanding citizens who want nothing to do with this folly? That's where the law steps in, led by the heavy-handed Captain Onishima. He'll bring in squads of Keystone cops, he'll break out the smoke bombs and tear gas, and he'll even whip out his piece and squeeze off a few rounds in your direction.

In a nutshell, then, Jet Set Radio offers a 3D environment where you collect spray cans, locate the walls that require tagging, tag said walls, and avoid the coppers. Tagging is accomplished by getting close to a wall and pulling the left trigger. You'll then be prompted to perform different circular motions on the analogue thumb pad to simulate the spraying of the paint.

Bonus points are won by performing various flips, kicks and grinds throughout the area. Being the dense cityscape that it is, there are plenty of railings, clotheslines, and drainpipes to slide along.

Given the number of things one can do, the control interface is surprisingly simple. Apart from tagging, the left trigger is an all-purpose button for bringing the camera front and centre, lining up for a grind, and hitching a ride behind a car. Unfortunately, with everything stacked on the left trigger, there's a lot of room for getting confused by what's happening on the screen. Eventually you'll just want to close your eyes, pull the trigger madly, and hope for the best.

In spite of the somewhat unique game concept, Jet Set Radio makes its mark through its choice of graphical and audio presentation. Using a technique called cel-shading, the outer edges of polygonal objects are given a thick black outline, which creates a pseudo-animated appearance. As a matter of style the game is a near perfect expression of funk and hip-hop. The non-gaming appeal of Jet Set Radio should be enough reason for anyone to give it a shot.



As everyone knows, your average graffiti gang members dress like characters from the Jetsons and perform gravity defying rollerblade stunts

game details

✓ **Excellent sense of style. The choice of graphics and music is what sets this game apart.**

✗ **Over-simplified control interface can lead to confusion.**

Minimum Requirements: Control pad, VMU
Recommended: As above

Developer: Sega www.sega.co.jp
Distributor: Ozisoft (02) 8303 6800

atomic
8/10

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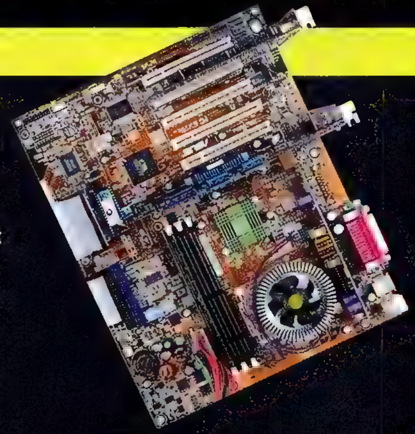
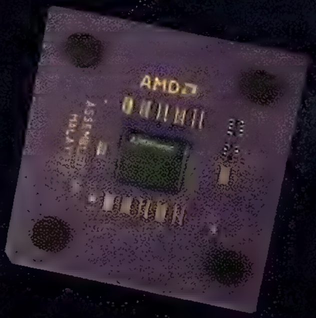
Atom02

With special thanks to AMD (www.amd.com) and Cassa (07 5445 2992) three lucky new subscribers to atomic will be entering a new world of performance. These prizes will be drawn at random from new subscribers during the onsale period of issue 2 (21th February to 20th March).

First Prize is a 1GHz Athlon sitting in the all-new Asus A7V133 motherboard. The A7V133 is one of the first boards to appear featuring VIA's new KT133A chipset. The A7V133 has support for 200MHz and 266MHz FSB socket AMD processors and has support for PC100 and PC133 SDRAM. The motherboard also features a Promise UDMA/100 controller and has optional RAID 0 Support.





Second Prize is an 800MHz Duron with an Asus A7PRO motherboard. The A7PRO supports 200MHz FSB socket AMD processors with support for PC100 and PC133 SDRAM and UDMA/66 hard drives.

Third Prize is a 650MHz Duron with an Asus A7PRO motherboard.

A big bonus with the A7V series of boards is the extensive range of hardware and software configuration options, making them the atomic favourites when it comes to precise control of your system. In combination with the solid performing AMD Athlon and Duron chipsets these provide a rock solid foundation for an atomic class PC.

(HSF, video, RAM and sound card not included)

DEAD or ALIVE

SFX

the evolution of 3D

A key part of any computer is the graphics hardware. In only a few years this hardware has been developing at an alarming rate. John Gillooly takes a look at the past, present and future of 3D

Few people would remember the Diamond EDGE 3D. Released in mid 1995, this card was arguably the first true 3D accelerator to hit the market, preceded only by the Matrox Millennium, which shipped with a specially optimised "3D" version of Nascar Racing. The VRAM version of the Diamond EDGE 3D utilised a chipset called the NV1 from a relatively unknown company called NVIDIA.

The Diamond EDGE 3D touted a wide range of gaming support for its proprietry API from companies including Electronic Arts, Activision, Sega, Crystal Dynamics, Papyrus and Domark. In reality it shipped with a handful of Sega PC games and the wider support failed to materialise.

This was followed in late 1995 by Creative's 3D Blaster, which used a cut down version of the GLINT chipset from 3Dlabs.

The 3D revolution gathered more solidity with the release of the Vèritè (V1000) chipset by Rendition in early 1996. Again relying on a custom graphics API, called RRedline, the Vèritè enjoyed a larger degree of support than the previous chipsets.

≫

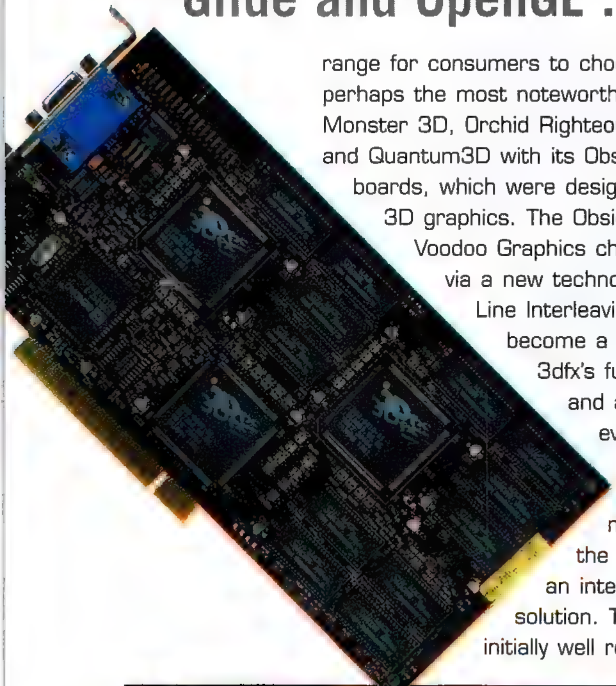
The Voodoo Age

However the chipset that was set to truly revolutionise the gaming and graphics industries lay just around the corner. Newly formed 3Dfx announced their Voodoo Graphics chipset at COMDEX 1995, and began shipping chips in 1996. The Voodoo Graphics became the most widely adopted of this first generation of 3D accelerators. With support for 3dfx's native Glide API, an OpenGL implementation of Glide and the initial iterations of Microsoft's Direct3D, cards based on this chipset ruled the 3D roost for almost two years.

The impact of the Voodoo Graphics cannot be underestimated. For the majority of people, their first experience with accelerated 3D was seeing it run on a Voodoo based card. With a large selection of card manufacturers striving to produce the "best" Voodoo card there was a wide range for consumers to choose from. Of these, perhaps the most noteworthy were the Diamond Monster 3D, Orchid Righteous, Canopus Pure3D, and Quantum3D with its Obsidian series of boards, which were designed for professional 3D graphics. The Obsidian utilised two Voodoo Graphics chips running in parallel via a new technology called SLI (Scan Line Interleaving), which was to become a major feature of 3dfx's future product lines, and arguably lead to the eventual death of 3dfx.

3dfx attempted to move into the OEM market by releasing the Voodoo Rush chipset, an integrated 2D/3D solution. The Voodoo Rush was initially well received by gamers, with a perception that an integrated Voodoo solution would be the ideal way to move into 3D. However the chipset performed poorly in 2D and its 3D performance was still good, but not as fast as a pass-through Voodoo Graphics based board. In a surprising move, 3dfx actually made an offer to Voodoo Rush owners that they could send their Rush boards in and receive a Voodoo Graphics pass-through board in exchange, stating "we regret that there are any dissatisfied users, particularly if that dissatisfaction is based upon a misunderstanding that Voodoo Rush would run all applications as fast as Voodoo Graphics..."

> "... game industry support still rested in the hands of Glide and OpenGL ..."



ⓘ This is not just any old Voodoo2 card. This one was made by STB, the company which was purchased to manufacture 3dfx brand cards.

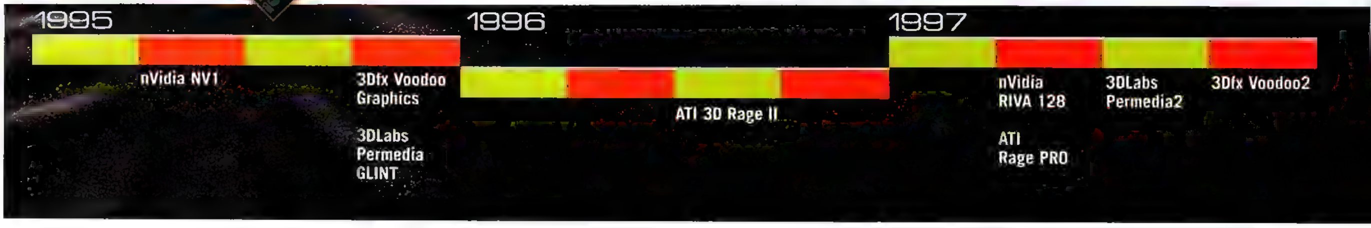
A New Beginning

Suddenly an embryonic industry had its first standard. Future card releases were all lined up against the might of 3dfx. Such companies began releasing their contenders for the 3D crown. NEC and VideoLogic teamed up to create the PowerVR chipset, which was initially less than impressive, with incomplete Direct3D support and high CPU dependence, however its second generation chipset, the PCX2, included improved OpenGL and Direct3D support, as well as its custom PowerSGL API. This second generation chipset is still going strong today, powering the Sega Dreamcast and arcade machines.

NVIDIA, burnt by the lack of success of the NV1, released their RIVA 128 2D/3D chipset. Rather than push a proprietary API, the Riva 128 was designed to fully utilise Microsoft's emerging DirectX natively. However, game industry support rested in the hands of Glide and OpenGL, with Direct3D still seen as coming in a poor 3rd place.

ATI, known as a high volume/low cost supplier of graphics solutions, made a move to 3D with their 3D Rage II chipset, which was a low cost if not stellar performing solution not unlike the ViRGE chipset from S3 (another stalwart of the low cost graphics industry).

3Dlabs, pioneers of the professional graphics industry made inroads with its mass-market option, the Permedia2, which boasted good OpenGL performance and above average Direct3D, although still not at the Voodoo Graphics level.



Generation 2

At the same time that 3Dlabs was launching its Permedia2 chipset, 3dfx made its next big move. At COMDEX in 1997 it announced the follow up to the Voodoo Graphics: the Voodoo2. Touted as having three times the power of the Voodoo Graphics chipset, the announcement had consumers anxiously awaiting its release.

Remember the Quantum Obsidian boards and their SLI feature? Well, one of the big selling points for the Voodoo2 was its ability to join two boards in SLI mode (as long as the boards were both the same brand and memory configuration). This allowed unheard of graphics processing power and provided an unbeatable 3D graphics solution, although prohibitively expensive for most.

The Voodoo2 was still a pass-through board, so midway through 1998 3dfx released the Voodoo Banshee, its second attempt at a 2D / 3D solution, which showed great improvement over the disaster that was the Voodoo Rush, and proved popular especially with OEMs.

In September and October of 1998 several companies released new chipsets, with ATI's RAGE 128 GL, Matrox's G200 series and S3's Savage3D lining up alongside the Voodoo Banshee and NVIDIA's next chipset, the RIVA TNT. The TNT was an integrated 2D/3D solution which ended the age of pass-through 3D and provided the first serious competitor to 3dfx's stranglehold on the 3D market and forcing 3dfx into a game of catch-up from which it never fully recovered.

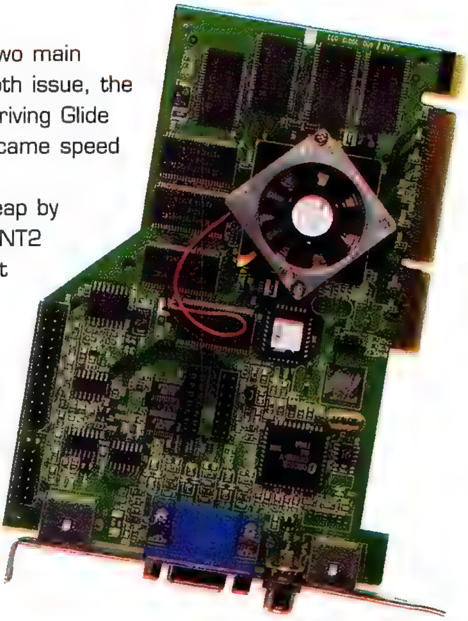
16-bit vs. 32-bit – The Next Big Battleground

At COMDEX in 1998, 3dfx announced its next chipset; the Voodoo3. Soon after, it revealed its intentions to purchase STB, a respected but somewhat low profile manufacturer of 3D cards of all flavours. This led to a major change in 3dfx's way of doing business. It abandoned the third party chipset manufacturers and moved into a new role of self-contained chipset and board manufacturer, much as ATI and Matrox operated.

Just when the Voodoo3 looked to regain 3dfx's lead, NVIDIA announced its TNT2 (running below its touted specifications). This new chip performed on par with the Voodoo3 but was capable of running in 3D in 32-bit colour, whilst the Voodoo3 was still only capable of running in 16-bit colour.

The battlelines came down to two main features; one being this colour-depth issue, the other being support for the still thriving Glide API. At its essence the debate became speed vs. quality.

The TNT2 Ultra was the next leap by NVIDIA. The Ultra was a normal TNT2 chipset that was certified to run at a higher clock speed (much like a Coppermine PIII 850 is the same core as a Coppermine PIII 700) just rated at a higher frequency, coupled with higher frequency RAM. The Ultra performed similar to the initial TNT2 specifications and pushed NVIDIA back ahead of 3dfx in the speed race.



The Canopus Spectra 2500, one of the most fully featured RIVA TNT Cards, even included an internal pass-through for connection to Canopus Voodoo2 cards.

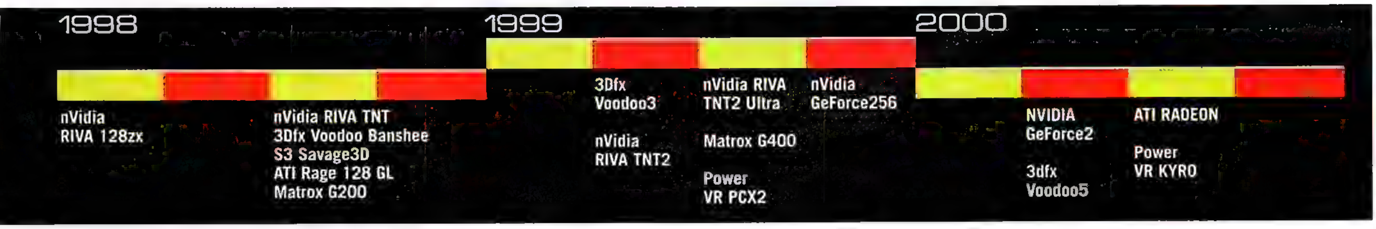
> **"At its essence the debate became speed vs. quality."**

Around the time of the Ultra being released Matrox hit back with its G400. In the previous year Matrox had released the G200, which was a competent 3D card, but never enjoyed the success of the TNT or the Voodoo2. The G400 was a different beast altogether. Matrox's flagship card, the G400 MAX, was a serious competitor to the Voodoo3 and TNT2 Ultra, with blistering speed and incorporation of hardware support for new technology such as Environmental Bump Mapping. The G400 was ahead of its time, the first fully-fledged third generation 3D accelerator.

The Dawn of the GPU

NVIDIA's third generation card, the GeForce256 was released later in 1999, reinforcing NVIDIA's six-month product release cycle. The GeForce256 was the first card to feature a "Graphics Processing Unit" or "GPU", designed to take a further load of the CPU through Hardware Transform and Lighting, which is heavily dependant upon software support.

Soon after, 3dfx announced its VSA-100 chip, which was set to power its next generation of >



cards, the Voodoo4 and Voodoo5. This featured 3dfx's T-Buffer, the 3dfx answer to the GPU move towards new functionality. The most touted feature of the VSA-100 was its support for Full Scene Anti-Aliasing, a means of removing the "jaggies", visual artefacts caused by low resolution interpolation of diagonal lines.

Again the legacy of SLI reared its ugly head, with the VSA-100 chips designed to be used in multiples on each card. The Voodoo5 5500 used two chips, and its high-end card, the much talked about but never released Voodoo5 6000 was to have used a stunning four VSA-100 chips.

By the time the Voodoo5 5500 appeared, NVIDIA had moved another step ahead, releasing its current flagship, the GeForce2, its fastest and most feature packed chipset to date.

> **"Suddenly the 3D market looked like a three horse race between NVIDIA, ATI and 3dfx."**

The Voodoo Graphics card to have, the Orchid Righteous

The Voodoo5 5500 just couldn't keep up. Its performance level was equivalent to NVIDIA's budget level GeForce2 MX chip, and far from the blistering performance of the GeForce2 GTS. 3dfx's hope now rested with the forthcoming Voodoo5 6000.

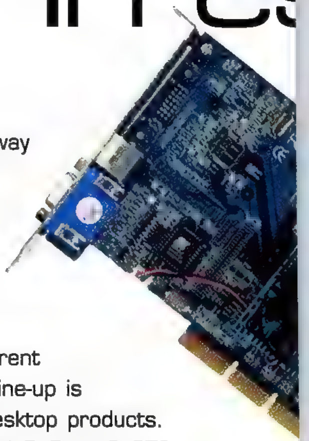
At this time an unlikely competitor emerged. ATI, launched its new chipset; the RADEON. Despite driver problems, the RADEON emerged with a performance level just below the GeForce2 GTS.

Suddenly the 3D market looked like returning to a three horse race between NVIDIA, ATI and 3dfx. With huge delays, COMDEX 2000 looked like the place for 3dfx to announce the Voodoo5 6000.

What it did announce sent shockwaves through the industry. The 4-way SLI technology used in the Voodoo5 6000 was to be exclusively licensed to Quantum3D; makers of the first SLI Voodoo Graphics boards and was not going to appear in a retail Voodoo board.

At the same show 3dfx announced plans to return to its traditional role as a chipset manufacturer, abandoning its card manufacturing business. And then, in December the final nail in the 3dfx coffin dropped with the announcement that NVIDIA was to buy 3dfx's core graphics assets, spelling the end of the reign of 3dfx. ▢

The Irres



NVIDIA

www.nvidia.com

NVIDIA has come a long way since its first abortive attempt at a 3D accelerator, the NV1. Whilst the industry anxiously awaits NVIDIA's new graphics chipset, codenamed NV20, its current champion, the GeForce2 line-up is settling into three main desktop products. Following on from the initial GeForce2 GTS cards, the line-up now features MX, Pro and Ultra variants.

The GeForce2 MX is its budget offering, with performance similar to the GeForce256 range of cards. At the high-end is the GeForce2 Ultra, with a core running at 250MHz and memory clocked at 230MHz DDR (an effective speed of 460MHz).

The newest entry is the GeForce2 Pro. These cards are essentially GeForce2 GTS' with RAM running at 200MHz DDR (effectively 400MHz). Performance wise, the Pro sits mid-way between the GTS and the Ultra, but with a price much closer to the GTS. It is envisaged that the Pro will take over from the GTS as NVIDIA's mid-range option in the GeForce2 arsenal.

ATI

www.ati.com

ATI is being widely backed as the next competitor to NVIDIA in the consumer 3D race. It is also the largest graphics manufacturer on the planet, with revenue of $US1.37 billion last financial year, dwarfing even the emerging NVIDIA powerhouse.

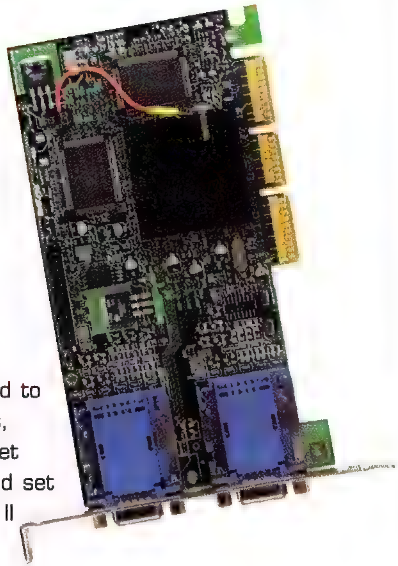
The ATI RADEON is its current flagship chipset. Released mid last year, well before people

Sorting out the chips

In an effort to look at the performance difference between chipsets, we have lined up as many different types of cards in the atomic labs and put them through their paces. Since as these cards are focused on 3D graphics performance, we tested them at a variety of resolutions in 3DMark2000 Pro (www.madonion.com) and Quake 3: Arena.

The results demonstrate the huge lead that NVIDIA has in the raw power stakes. Of special note however is the RADEON 64MB DDR, which is the only card to even approach the high-end NVIDIA cards, largely due to the HyperZ architecture providing increased performance at

stible Force



Matrox G450, Honey I shrunk the G400.

The newest line from NVIDIA, the chipset king, the GeForce2 PRO.

expected ATI to unveil a new chipset, the RADEON proved a surprise package, being the only card that came close to the GeForce2 in terms of speed and features.

The RADEON features hardware Transform and Lighting via the Charisma engine (which are similar to the GeForce2 Transform and Lighting functions, with some added extras), as well as ATI's Pixel Tapestry architecture, similar in function to NVIDIA's Shading Rasteriser. It also uses HyperZ, a technology which assists efficient z-buffer performance at high resolutions. The RADEON also includes support for Environmental Bump Mapping, a big selling point of Matrox's G400 cards and a feature not included on the GeForce2 chipset. The RADEON also has support for the DirectX 8 API's 3D textures and four matrix vertex skinning.

Matrox

www.matrox.com

Matrox is regarded as a solid performer in the 2D graphics field with occasional flirtations with the world of 3D acceleration. The Matrox G400, released at the same time as the Voodoo3 and TNT2 Ultra, surprised most and is a definite contender in the 3D race.

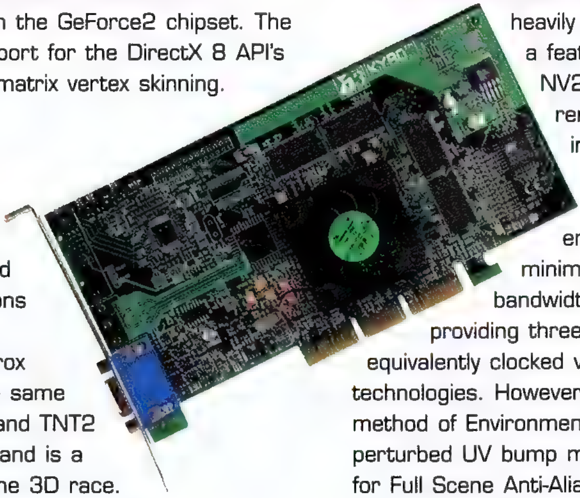
Matrox has been quiet since then, with its recently released G450 cards being nothing more than G400s on a 0.18 micron die.

The G450 is being pushed as a business graphics card rather than a gaming one, something that is shown by its performance in our standard 3DMark2000 Pro and Quake 3: Arena benchmarks.

Imagination Technologies

www.powervr.com

PowerVR is a division of Imagination Technologies. Rather than focus on PC graphics solutions, PowerVR is committed to developing for a wide variety of platforms, most notably the PC with its KYRO chipset and the PCX2-based Sega Dreamcast and set top boxes and Segas Naomi, and Naomi II arcade systems.



The latest chip from PowerVR, the KYRO inhabits the VideoLogic Vivid!

The KYRO is the PC implementation of PowerVR's Series3 chipset. The KYRO uses a tile-based rendering system, and relies heavily on Hidden Surface Removal, a feature touted to be in NVIDIA's NV20 chipset. Tile-based rendering is explained in depth in Z-Access (page 16).

Notable in that it doesn't possess a hardware T&L engine, the KYRO is able to minimise traditional memory bandwidth bottlenecks, while providing three times the fill rate of equivalently clocked versions of competing technologies. However the KYRO does feature a method of Environmental Bump Mapping known as perturbed UV bump mapping, alongside support for Full Scene Anti-Aliasing.

The chipset is interesting in that, whilst it doesn't excel at high resolutions, it is designed to cope with increasing image complexity due to its reliance upon tile-based rendering. Coupled with Full Scene Anti-Aliasing support, the KYRO is an interesting take on graphics card technology.

higher resolutions.

It is at the lower end of the performance (and cost) spectrum that the competition really shows, with the GeForce2 MX, Voodoo5 5500 and RADEON 32MB DDR showing almost identical levels of performance. The KYRO chipsets fall behind, largely due to their problems with higher resolutions.

Again donning the subjectivity hat, both the RADEON and the KYRO display a noticeable improvement in colour depth over the GeForce2 in 3DMark2000 Pro and Q3A. This is a minor concern but it does have a bearing on deciding between cards of a similar price.

Over the past six months the term "MX class" has emerged when referring to the lower priced 3D cards. With NVIDIA standing head and shoulders above the competition at the high end, it is the 'MX class' in which the battle between rival chip makers is now raging.

Bearing this in mind we took the normalised scores and ranked them by price to give an indication of which chip provides the best bang for your buck (so to speak). Again these values are relative, and are designed to show which chipsets give the best performance for the cost. Sitting at the top of the list is the GeForce2 MX, reinforcing the popular opinion that it is the best chipset

Sorting out the chips

for the money. The KYRO cards come out as showing great value for money, but their relatively poor performance at high resolutions and lack of a T&L engine are definitely things to consider. The ATI RADEON 32MB DDR also shows competent performance in the lower price range.

The results for the Voodoo5 are highly dependant upon the card staying at its recommended retail price. It is still unclear whether the Voodoo5 will drop in price or just disappear from the shelves altogether.

For the higher priced cards, the GeForce2 Pro definitely takes the cake. The GeForce2 Ultra may well be the performance king, but the high price still puts it firmly in the luxury item category. At $100 cheaper and with marginally faster performance over the GTS, and at $350 less than the Ultra, the Pro cards are the ones to go for.

What the numbers mean

From the raw results we normalised and weighed our benchmarks to get an overall indicator of performance. For this we focused heavily upon results at 1024 x 768, which is a realistic target for reasonable performance with today's technology. These values should only be used for comparison between the cards that we tested. The final weightings were as follows:

Quake III Arena

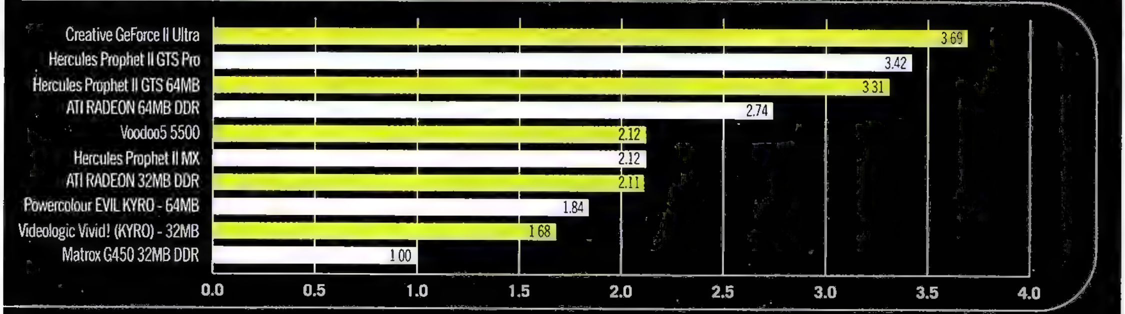
Normal graphics settings	10%
1,024 x 768 all settings maxed	30%
1,600 x 1200 all settings maxed	10%

3DMark2000 Pro

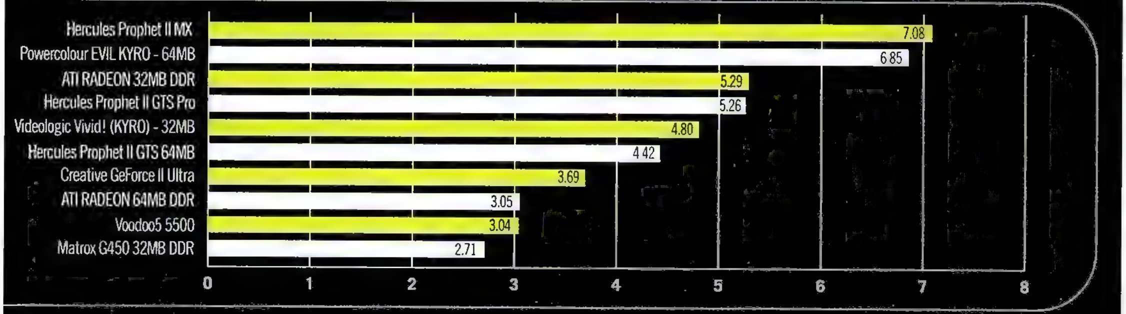
640 x 480 16-bit	10%
1,024 x 768 16-bit	30%
1,024 x 768 32-bit	10%

technical details

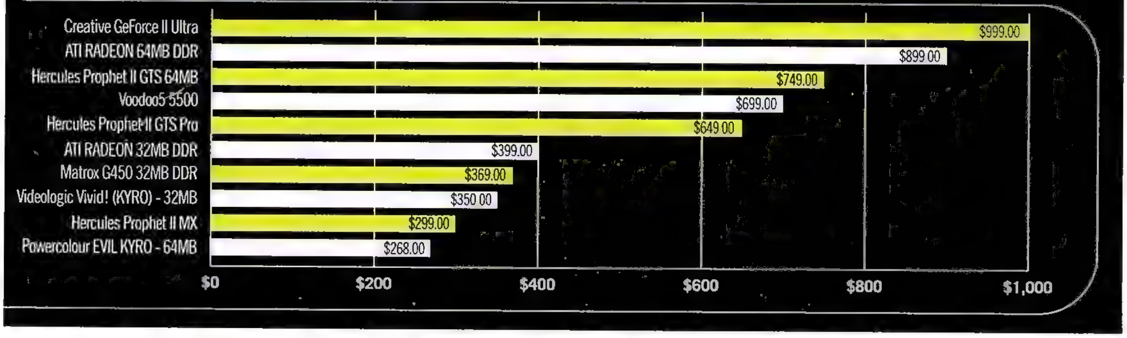
Relative Normalised weighted score



Relative Normalised weighted score / price x1000



Price



The Year Ahead

The centre of attention at the moment is NVIDIA's NV20 chipset, which is hotly tipped to be unveiled at the end of February this year. This has overshadowed the moves being made by the other chip makers.

The NV20 marks the first time NVIDIA's six-month release cycle has slipped since the introduction of the RIVA 128ZX. Details on the NV20 are currently scarce, following NVIDIA's reluctance to comment on products in development. Some features are certain, and that is support for DirectX 8 features such as programmable vertex processing and programmable pixel processing, coupled with support for hidden surface removal. Any other details are pure speculation at the moment.

Even less certain is the graphics chipset NVIDIA are developing for the Xbox. Alternatively codenamed NV25 and X-Chip, it is uncertain whether this will in fact be a slightly modified NV20 chip or NVIDIA's next generation chipset, which would fit into the six month chipset release cycle. Speculation has increased that the chip will be the NV20 since Microsoft revised the Graphics processor core speed down from 300MHz to 250MHz (the suspected core speed for the NV20) and since rumours started circulating that full speed Xbox development kits would be made available around the time of E3, which is due to be held in mid May this year.

With a sudden influx of support from the anti-NVIDIA crowd (largely the pro-3dfx crowd), ATI is the hot favourite to become the next serious competitor to NVIDIA. Details on ATI's next generation chips are even more scarce than those on the NV20, but expect to see 2 new chipsets from them this year, the R200 (codenamed Sidewinder) towards the end of Q1, and the R300 (codenamed Stinger) in Q4.

The R200 should increase the number of rendering pipelines to four, bringing the chip into line with the GeForce2. Also included should be full compatibility with DirectX 8, focusing on a programmable T&L unit. Apart from that, the specifications for the R200 chip are unknown at this time.

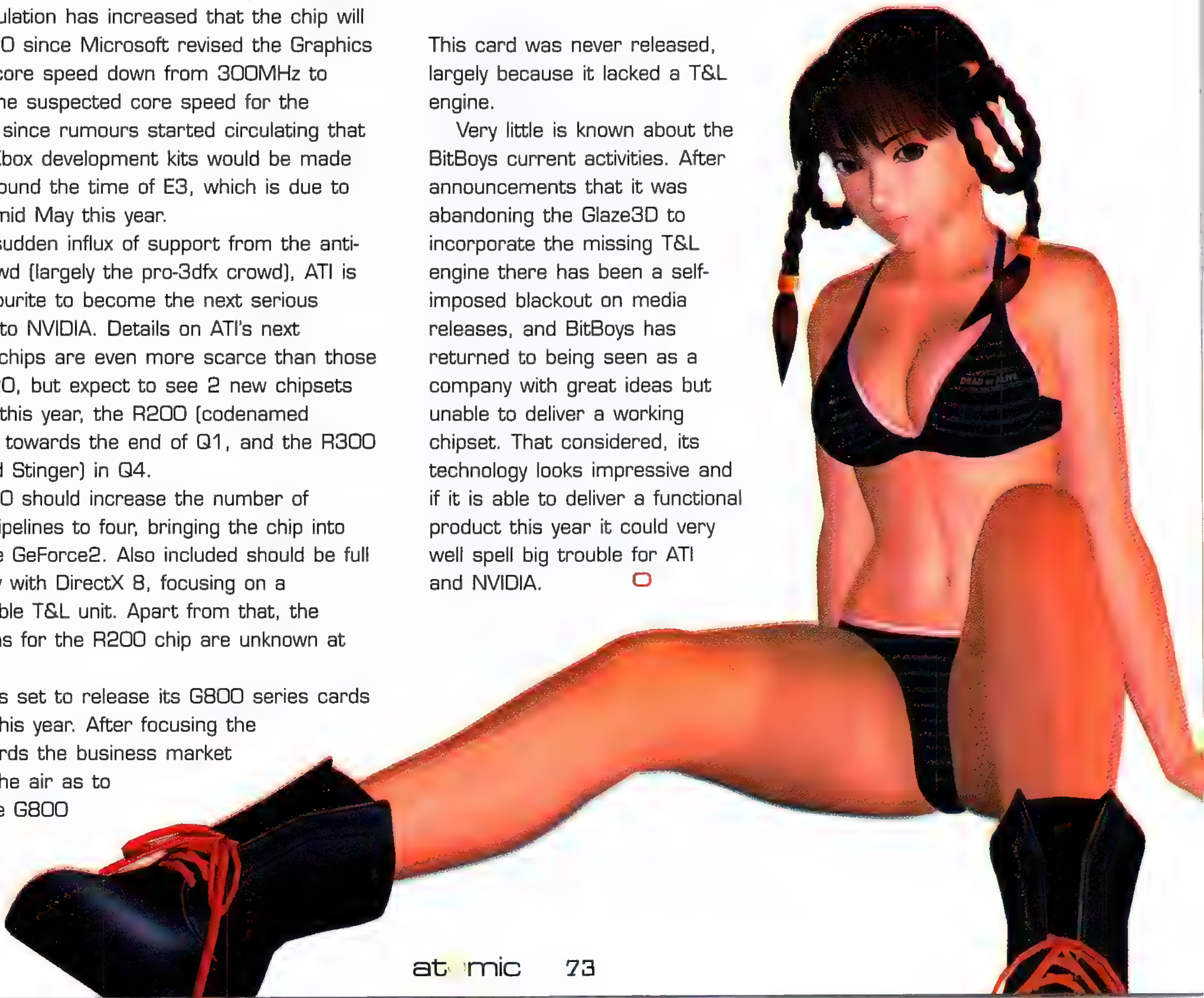
Matrox is set to release its G800 series cards sometime this year. After focusing the G450 towards the business market it is up in the air as to whether the G800 will be competitive in the high speed Transform & Lighting driven world of 3D graphics cards.

The dark horse in the Graphics race is BitBoys. This company has been working on a new generation of graphics hardware for a few years. Last year it almost released a graphics card known as Glaze3D, touted to have a four pixel pipeline and to utilise a proprietary technology known as XBA (xtreme bandwidth architecture) which is a graphics engine running eDRAM (embedded DRAM) using a 512-bit interface.

> **"Details on ATI's next generation chips are even more scarce than those on the NV20"**

This card was never released, largely because it lacked a T&L engine.

Very little is known about the BitBoys current activities. After announcements that it was abandoning the Glaze3D to incorporate the missing T&L engine there has been a self-imposed blackout on media releases, and BitBoys has returned to being seen as a company with great ideas but unable to deliver a working chipset. That considered, its technology looks impressive and if it is able to deliver a functional product this year it could very well spell big trouble for ATI and NVIDIA.



You got a problem?

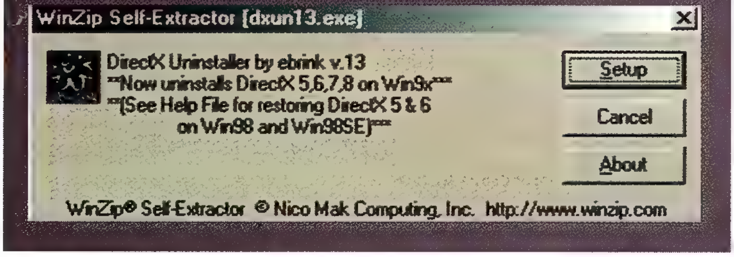
LETTER OF THE MONTH wins the Creative WebCam Go worth $249.00 with 4MB of memory, truckloads of free software and a special "Spy Cam" mode

Letter of the month: Be gone DirectX 8.0

How do I remove DirectX 8.0 to reinstall DirectX 7.0A? I have a Win98 SE operating system and from what I gather the 7.0A might help me push my 3DMark2000 score up a tad.
I currently suck at around 5350.
Don, Email

You are correct and have brought up a very popular question thus receiving this month's Atomic "Letter of the Month" prize. Many PC users upgraded to DirectX 8.0 thinking they'd instantly increase the performance of their system, particularly in games like Half-Life, which use DirectX to render graphics. However, DirectX 8.0 usually performs slower under Windows 9x compared to DirectX 7.0. You should notice a better 3Dmark score under Windows 9x if you revert back to DirectX 7.0, the default DirectX API coupled with Windows 98, 98 SE and ME. Many users of Windows 2000 have been reporting substantial improvements while using the latest version of DirectX (8.0). Unless you have trouble with either stability or performance, keep it installed under Windows 2000.

I direct you to visit www.tweaktown.com/files.shtml#dx, there you will find DX Uninstaller 1.3 by ebrink available for download which will uninstall DirectX 8.0 (or whatever version you have installed) and revert back to the previous version of DirectX, in your case DirectX 7.0. If you have problems, read the help file, it gives you step-by-step instructions on how to use the program properly.



WinZip Self-Extractor [dxun13.exe]

DirectX Uninstaller by ebrink v.13
Now uninstalls DirectX 5,6,7,8 on Win9x
**(See Help File for restoring DirectX 5 & 6
on Win98 and Win98SE)**

WinZip® Self-Extractor © Nico Mak Computing, Inc. http://www.winzip.com

Send your questions to io@atomicmpc.com.au or by post to:

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AMD Duron @ 133MHz FSB

I have a Duron 600 attached to an Asus A7V board. It is the stock 100MHz DDR FSB variety and I was wondering whether there would be any heat or other problems if I clocked the FSB to 133MHz DDR and reduced the multiplier. I have heard of this method and the speed advantage it offers in several overseas Web sites but I was wondering whether or not this is even possible to do. Any help would be greatly appreciated.
Leonid Raikhman, Email

Leo, I hate to tell you, but your A7V does not officially support the FSB speed of 133MHz. The Asus A7V motherboard only supports a maximum of 100MHz FSB (Front Side Bus) as it uses the VIA KT133 chipset. You might be able to slightly increase the FSB above 100MHz, but we doubt if you'll be able to raise it significantly – we have had very little success in overclocking via the FSB on the KT133 chipset. Your AMD Duron, with decent cooling, should be able to reach 133MHz FSB on one of the newer 133MHz FSB boards, as long as you lower the CPU multiplier. The new VIA KT133a chipset is capable of 133MHz FSB. Asus are producing a motherboard called the Asus A7V133, based on the A7V but incorporating the new KT133A chipset.

Should I get a Pentium 4?

I am in the process of buying a new computer, its main use will be for playing games like Quake 3, and other 3D shooters. I intend to buy a Pentium 4, 1.5GHz or higher and I don't want to have to upgrade the RAM later, with this in mind, how much RDAM should I have installed when I buy the computer? I have heard that more than 256 Meg is pointless, is this the case or should I get more? Also for this computer should I get 266, 356, or 400MHz RDRAM and do I need to get the RAM with ECC? Thanks for any help.
W Watkins, Email

The Intel Pentium 4 is getting mixed reports with online and off line media. Firstly, you may wish to take a gander at our "1.5GHz Pentium 4 RAMBUS vs. 1.2GHz Athlon DDR" article - Issue 1. As for gaming, the Pentium 4 supports the new SSE2 instruction set, but programmers have not yet implemented SSE2 into any games. Until it does you will never see a Pentium 4 beating a similarly clocked Pentium 3 processor. If you have the money, for an overly priced Pentium 4 system, go buy one, you will reap the rewards in months to come when the Pentium 4's features can be fully utilised, if it even happens, that is. Can't you see Intel sitting in the corner crossing their fingers? 128MB of expensive RDRAM aka RAMBUS (PC800) is included with Pentium 4 processors. I feel that amount of memory will be enough to handle all 3D intense games and applications for a few years to come yet. ECC (Error Checking Correction) RAM is used mostly for servers and is more expensive than normal RAM, unless you are running a server, you won't need ECC, it would just be a waste of money.

AGP speeds and dividers

G'day. My PC has an Abit BE6-II motherboard running a Hercules 3D Prophet II (MX) video card. The current CPU is a Pentium III 533 at 133MHz FSB. At this FSB speed the AGP port is set at 1/2, which I imagine means its bus is set at 66MHz. My first question is what does 1x, 2x or 4x AGP actually refer to? If I configure the AGP bus to 2/3 or 1/1 of the FSB will this increase the video card's performance or Increase the risk of damaging any of my system components?
Kevin Redman, Email

"The Intel Pentium 4 is getting mixed reports with online and off line media."

AGP divider settings can be a little tricky at first to understand, if the FSB is set at 133MHz and the AGP divider setting is set at 1/2, the AGP bus speed would indeed be 66MHz as you suggested. There are three main AGP divider settings, 1/2, 2/3 and 1/1. Select the divider that when multiplied by your current FSB speed will keep your AGP closest to the default AGP speed of 66MHz. You can damage AGP cards if you run the AGP port way over the default speed of 66MHz. Then you get into PCI divider settings, I'm sure we'll talk about this in a future issue of I/O. Many modern motherboards based on chipsets from AMD, Intel and VIA support AGP2x/4x. The AGP mode refers to the amount of bandwidth available to the AGP port.

Old School Dual 486 System

I am scratch building a PC and I want to have a dual 486. Is that possible? And what motherboard would I need? And how much and where can I get it cheap?
John Melling, Email

Yes, there is such a thing as a dual 486 system. Many years ago now, companies such as HP and IBM developed a dual 486 system for the server market; apparently they were never released to the retail market for consumer level use. These days, you will not find a system of this kind at your normal computer store. Instead, try looking at monthly swap meets, the computer trader newspaper, or contacting second hand computer stores. I'd imagine these systems would sell cheaply, be hard to find, performance would be rather poor and they would have trouble running most of today's 3D games and applications. In closing, I'd personally avoid a dual 486 system and if money permits buy an Intel or AMD dual system. A popular Intel dual motherboard is the Abit BP6, this motherboard allows you to use two Intel Celeron socket 370 processors in a SMP configuration.

Send your questions to io@atomicmpc.com.au or by post to:

i/O
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PO BOX 275
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CPU temperatures

I overclocked my P3 500 Katmai to 600 and it seems to be running sweet, as it's stable and all, but I just don't know what temperature it should be running at or what is normal for it. Right now it stays on 20 degrees according to this little software proggy I got. The chip has no extra cooling or anything just stock standard and I did it by 120FSB x 5.0 multiplier cause I don't know how to unlock the multiplier I just wanna know if you think I need any more cooling or anything, thanks.

ODessA, Email

> "... seems like a rather low temperature ..."

That seems like a rather low temperature for an overclocked processor, especially a processor of this kind. Try checking your BIOS temperature monitor when booting up and then comparing this to your software program to see if there is much of a difference. Most Intel Pentium III Katmai processors operate at around 25 to 30 degrees Celsius with stock HSFs (Heatsink Fan). Regarding unlocking the multiplier on Intel CPUs, you cannot do so thanks to Intel and a small group of naughty resellers who ruined it for the rest of us. Intel locked the multiplier in a bid to make it harder for resellers to get away with selling rebadged processors. Rebadged processors are CPUs that have been multiplier unlocked and are then sold as higher speed CPUs at an added cost. They were usually rebadged or altered to look exactly like the faster processor.

I/O by Cameron Wilmot of TweakTown.com – the ultimate hardware tweaking and overclocking website.

Send your questions to io@atomicmpc.com.au or by post to:

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CounterStrike Graphics

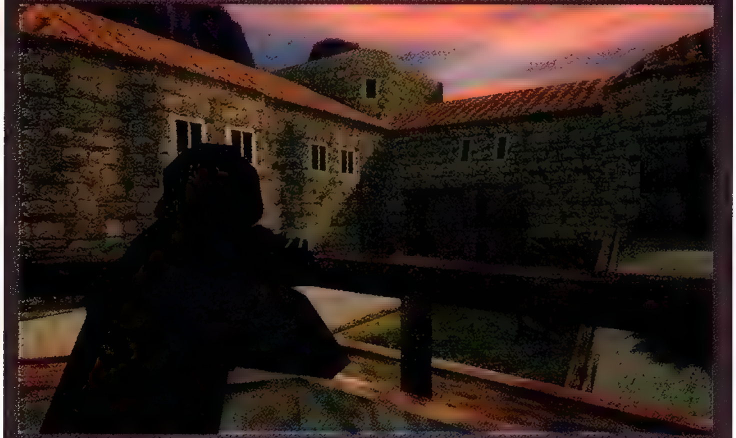
CounterStrike is one of the most widely played online games. Because it uses the Half-Life engine, which in turn is a modified Quake 2 engine, most modern systems are completely untaxed by its graphics. In order to get the most from your system there are some tweaks available for the graphics. These tweaks are added to your config file. This file resides in your CounterStrike directory, by default c:\sierra\Half-Life\cstrike or c:\sierra\Counter-Strike\cstrike depending upon whether you have Half-Life or the boxed version of CounterStrike.

Open the config.cfg file in notepad and look through it. This file contains all your binds and a host of extra settings. You may want to back the file up first, as is good practice whenever editing a config file. Check that the values don't already exist before you add them.

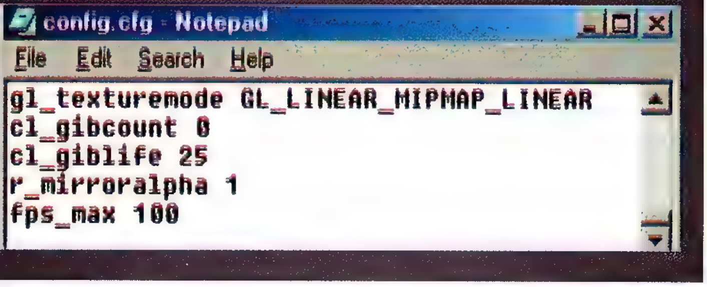
- fps_max is a command that can be used to cap your fps. With the new Half-Life netcode this is no longer an issue so we suggest setting this as high as possible, 100 being a nice even number.
- gl_texturemode is a command used to set the filtering used, which can provide a big boost to the look of the game. The four settings below can all be used: -

GL_NEAREST_MIPMAP_NEAREST - bi-linear low
GL_LINEAR_MIPMAP_NEAREST - bi-linear high
GL_NEAREST_MIPMAP_LINEAR - tri-linear low
GL_LINEAR_MIPMAP_LINEAR - tri-linear high

Another way you can tweak your framerate is by tweaking the gib settings: - cl_gibcount which is the amount of gibs generated, with 0 being none and 4 the highest setting and cl_giblife which controls the amount of time gibs stay around for, and can be set from 0 up to 25 seconds. The final setting, r_mirroralpha is used to control reflective textures and is a toggle between 1 (on) and 0 (off).



So, a fully tweaked, high quality CounterStrike config should include this: -



```
gl_texturemode GL_LINEAR_MIPMAP_LINEAR
cl_gibcount 0
cl_giblife 25
r_mirroralpha 1
fps_max 100
```

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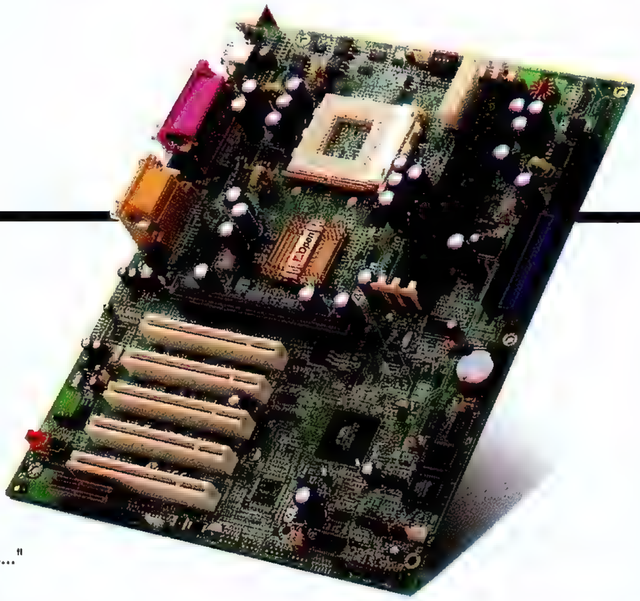


AK73 Pro

KT-133 **ATA-100**

"...AOpen AK73 Pro was pretty impressive. **It beat our previous performance leader, the ASUS A7V,** in the majority of benchmarks."

- Review from Tom's Hardware Guide.

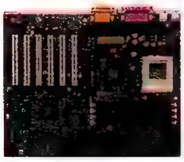
"... AK73 Pro was rock solid, mainly the result of a solid layout, proper placement of surface mount components..."

- Review from AnandTech

ANANDTECH

CPU protection	Specially designed BIOS for AMD CPU, preventing overheating and burning
KT133	Supporting AMD Athlon/Duron up to 1.1Ghz
ATA 100	Supporting ATA-100/66 IDE
Over Clock	Adjustable clock ratio, front side bus, and V-core
Super BIOS	Well calibrated hi-performing BIOS, highest Winston value
V-IO	Adjustable V-IO for over clocking
4X AGP	Supporting 4x AGP and 4 USB Ports
Dr. VOICE	"Dr. Voice" voice debug function
Die-Hard BIOS	Supporting Die-Hard BIOS (Two BIOS), Always Virus-free.(Optional)
Dr. LED	"Dr. LED" debug function.(Optional)

AX34 PRO II



- Support Intel FC-PGA PIII
- VIA694X, support socket 370
- Dr. Voice on board

AX37 PRO

- Support Intel FC-PGA PIII
- VIA APOLLO Pro266 / DDR
- 1 MHz Stepping Frequency Adjustment

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Main
Advanced
Power
Boot
CPU Internal Frequency
CPU Frequency Multiple
FSB/SDRAM/PCI Freq. Ratio
FSB/SDRAM/PCI Freq. (MHz)
CPU Vcore
CPU Level 1 Cache
CPU Level 2 Cache
CPU Level 2 Cache ECC Check
BIOS Update
PS/2 Mouse Function Control
USB Legacy Support
OS/2 Onboard Memory > 64M
Chip Configuration
I/O Device Configuration
[Manual]
[66:100:
[1.65V]
[En
[En
[Di
[En
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1.95
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1.85
1.80
1.75
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1.65
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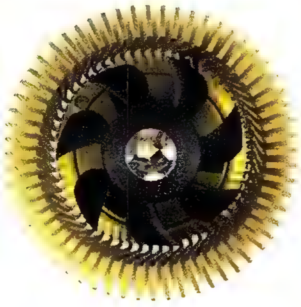
tutorial

It is time to squeeze that extra drop of performance from your Intel chip, with our how-to guide for overclocking Celeron and Pentium III processors. Plus we show you the best way to keep them cool with our Socket 370 heatsink/fan roundup.



Disclaimer ⚠

While techniques like overclocking and modifying your hardware can give you a significant increase in performance for little cost, it still remains that there is no such thing as a free lunch. Performing any modifications to your hardware runs the risk of doing irreparable damage to it or other components in your PC and can also void your warranty. Before you do anything to your hardware or software, always be sure to read all documentation and warranty information thoroughly. Also check any other documents, such as contracts or licenses for software and services, to ensure that you do not break any agreements. atomic MPC and AJB Publishing cannot be held responsible for any damage done to your hardware or software through performing techniques outlined in this magazine. Keep yourself informed – and proceed at your own risk.

Intel Overclocking

Bennett Ring gets his hands dirty overclocking Intel's CPUs

If you own an Intel CPU and are getting a tad jealous at the impressive speed increases AMD owners are getting from overclocking their shiny new Durons and Thunderbirds, fear not, atomic is here to show you how to get the most out of your Intel CPU.

Unfortunately, if you're expecting the pathetically easy 2-setting overclock of the AMD Socket A chips, we're here to let you down in a calm and gentle manner so that any thoughts of suicide due to your crash in expectations aren't too strong. Intel locked the multiplier on their range of CPUs several years ago after a bout of 're-badging' by dodgy retailers who sold overclocked chips as higher speed chips, and then charged for the price of the higher speed chip.

Also, due to their FSB method of overclocking, don't expect quite as spectacular overclocking gains with Intel CPUs as the AMD range.

Intel's chips still aren't particularly difficult to overclock, it's just that they need a few more parameters tweaked for a nice stable overclock. Which is why we're here to show you the way...

> **"... still aren't particularly difficult to overclock, it's just that they need a few more parameters tweaked ..."**

step one: PC checkup

As mentioned in last month's AMD overclocking article, it is of paramount importance that your system is running perfectly before any overclocking is attempted. This will enable you to determine if any new crashes are caused by the overclock or an older existing problem. At this point, it is wise to undo any performance tweaks you may have made in the past, such as running the system memory at its limit, as these may cause an overclocked system to crash, and the performance increase of the overclock should be greater than those of your tweaks.

■ The dreaded motherboard BIOS flash is worthwhile if you are running an older version of your motherboard's BIOS. These can lead to increased stability and 'overclockability' in your system. Beta releases of BIOSs can be unstable, so stick with final release versions over betas.

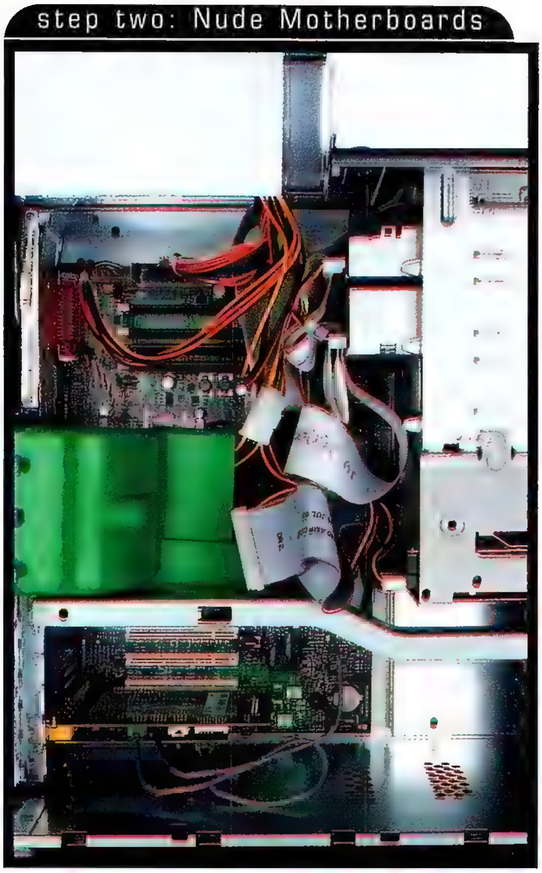
■ If you didn't happen to see last month's overclocking article, atomic's main benchmarks of choice are 3DMark2000 Pro, SiSoft Sandra 2000 and Quake 3 Arena. Fire these up and find out just how your system performs before the overclock. Run them for as long as possible to establish that your system is stable.

Tools needed

1x Intel CPU
1x Intel compatible motherboard
(THIS MUST SUPPORT FSB SPPED ADJUSTMENT IN SMALL INCREMENTS, AND PREFERABLY CPU ADJUSTMENT)

Difficulty: Advanced

step two: Nude Motherboards

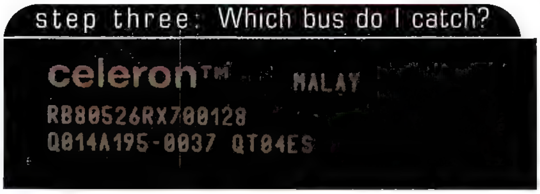


If you don't have case fans keeping the interior of your box nice and chilly, remove the cover from your PC. Overclocking the CPU usually increases the temperature of the chip, so adequate airflow of cool air into the heatsink can aid in wrenching a bigger speed increase from the CPU. Once you've reached your overclocking peak, replace the case. If it begins crashing you know you have a case temperature problem, which can usually be rectified with a couple of cheap case fans. Or if you're really cheap and desperate, a small room fan next to an open case can do wonders, although you can't blame us if people laugh at your setup.

Errors of the worst sort

When overclocking via the FSB, the hard drive is put under added strain. We noticed several times when trying to push the FSB too high that registry errors as well as errors in the FAT32 tables started to occur. This necessitated the full reformatting of that partition followed by a Windows reinstall. This sort of error will not occur when overclocking via the multiplier. So ensure you have backed up everything of importance to another partition or disk before attempting to overclock via the FSB.

step three: Which bus do I catch?



Now comes the hard part - identifying which type of Intel CPU you are using so that you can determine what is the best FSB (Front Side Bus) speed for your overclocking adventure. If you have a Celeron, this is easy - all Celerons run on a 66MHz FSB unless they are the brand new 100MHz version, which no doubt will be prominently advertised when you buy it. If you own a PIII CPU it's a different, and incredibly confusing, story. The PIII's come in 4 flavours:

- Katmai core with 100MHz FSB
- Coppermine core with 100MHz FSB
- Katmai core with 133MHz FSB
- Coppermine core with 133MHz FSB

If you were sold a processor with a B extension in its name (i.e. PIII-800EB) you can be sure that you are running a PIII that requires a 133MHz FSB speed. However, if you don't have a B extension, it does not necessarily mean your CPU doesn't have a 133MHz FSB, an example being the PIII-733 - not a B to be seen but it still runs on the 133MHz FSB. To make matters worse, the schmuck at Intel in charge of product ID codes decided to not bother with a uniform type of identification number printed on the top of each CPU. Newer PIII's set out their CPU info on top of the chip as such:

933/256/133/1.7V

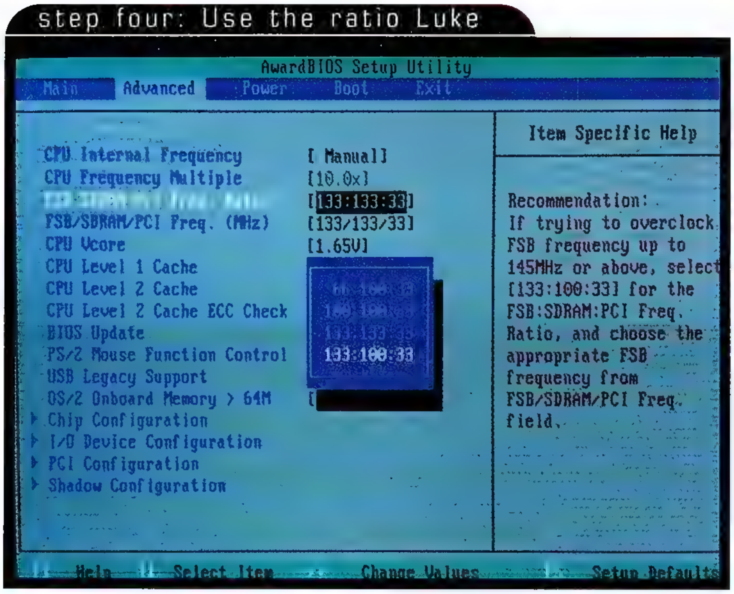
For the above line from our PIII-933 we can see that it has a 133MHz FSB. If you're lucky enough to have this type of product ID code on top of your PIII, it is quite simple to identify your CPU's default FSB speed by simply looking at the 3rd entry in the above string - it will be either 100 or 133. HOWEVER, looking at some of our older PIIIs we saw the following info printed on top of the CPU:

RB80526RX667128
Q011A233-1580 QT03ES

Try as we might, we couldn't find any guides at Intel's site that breaks this code down into anything meaningful. If you happen to have one of the chips marked in this way, the quickest way to find out the default FSB that your CPU runs at is to experiment with either 100 or 133 as the FSB within your BIOS (see next step) and see which one allows the system to boot successfully.

CPUs with lower default FSB speeds tend to overclock better, so if you're buying a PIII with overclocking in mind, go for the PIII with a 100MHz FSB over a PIII with a 133MHz FSB.

step four: Use the ratio Luke



```
AwardBIOS Setup Utility
CPU Internal Frequency            [ Manual]
CPU Frequency Multiple            [10.0x]
                                  [133:133:33]
FSB/SDRAM/PCI Freq. (MHz)         [133/133/33]
CPU Vcore                         [1.65V]
CPU Level 1 Cache
CPU Level 2 Cache
CPU Level 2 Cache ECC Check
BIOS Update
PS/2 Mouse Function Control
USB Legacy Support
OS/2 Onboard Memory > 64M
▸ Chip Configuration
▸ I/O Device Configuration
▸ PCI Configuration
▸ Shadow Configuration
```

Item Specific Help

Recommendation:
If trying to overclock FSB frequency up to 145MHz or above, select [133:100:33] for the FSB:SDRAM:PCI Freq. Ratio, and choose the appropriate FSB frequency from FSB/SDRAM/PCI Freq. field.

Once you have discovered the correct default FSB speed, it is time to enter the dreaded BIOS zone, that strange blue place where mere mortals fear to play, afraid of turning their PC into an unbootable heap of scrap metal. You will need to find the BIOS setting that sets the FSB:SDRAM:PCI Frequency Ratio - in our Asus CUSL2 this was under the main 'Advanced' menu and has the following four settings:

> **"... it is time to enter the dreaded BIOS zone ..."**

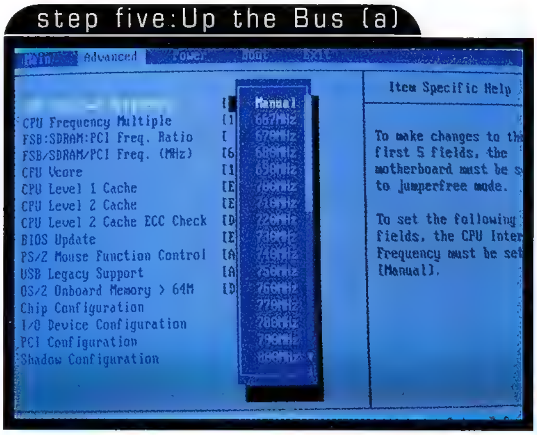
- 66:100:33 - this is the setting to use for 66MHz Celerons.
- 100:100:33 - use this setting for 100MHz FSB PIIIs and Celerons to set the FSB at 100MHz combined with 100MHz SDRAM.
- 133:133:33 - suitable for PIII's with a 133MHz FSB combined with 133MHz speed SDRAM.
- 133:100:33 - use this setting for PIIIs with a 133MHz FSB combined with 100MHz speed SDRAM. This setting is also useful for people with PC133 RAM that will not run at speeds above 133MHz, because as we begin raise the FSB when we begin overclocking, the SDRAM speed will rise in similar increments.

Select the setting based upon the default FSB speed of your processor and your RAM speed.

All HSF combinations were kindly supplied by MOS technologies www.mos.net.au

Several of our Celerons were also kindly donated by AusPC Market www.auspcmarket.com.au

step five: Up the Bus (a)



```
CPU Frequency Multiple
FSB:SDRAM:PCI Freq. Ratio
FSB/SDRAM/PCI Freq. (MHz)
CPU Vcore
CPU Level 1 Cache
CPU Level 2 Cache
CPU Level 2 Cache ECC Check
BIOS Update
PS/2 Mouse Function Control
USB Legacy Support
OS/2 Onboard Memory > 64M
Chip Configuration
I/O Device Configuration
PCI Configuration
Shadow Configuration
```

Item Specific Help

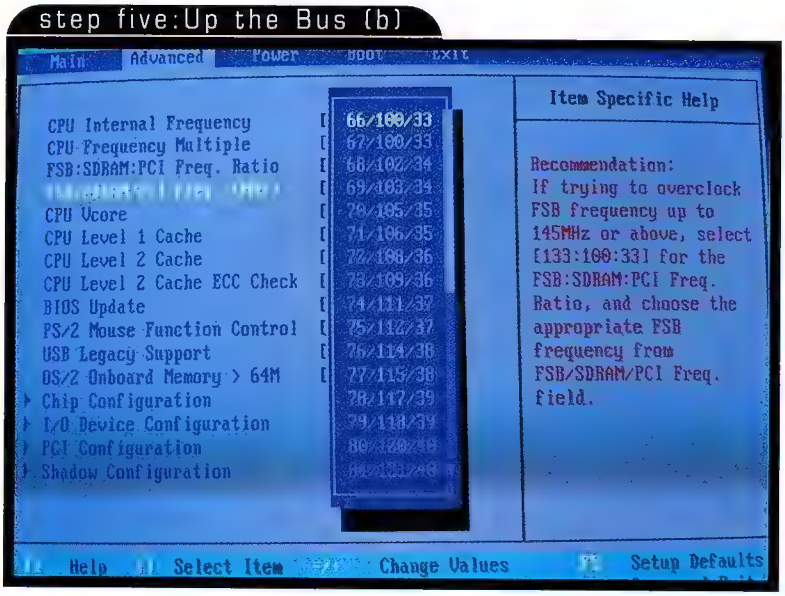
To make changes to th first 5 fields, the motherboard must be s to jumperfree mode.

To set the following fields, the CPU Inter Frequency must be set [Manual].

Intel aren't quite as generous as AMD when it comes to overclocking, as all Intel CPU's are multiplier locked. So to overclock your Intel CPU you must increase the FSB speed that it is running at. For example, a Celeron 667 runs at a default FSB of 66MHz with a 10X multiplier. If we increase the FSB to 80MHz the Celeron will be running at 800MHz, whilst a FSB setting of 85MHz would result in an 850MHz Celeron.

Our reference motherboard, the Asus CUSL2, has two ways of changing the FSB for overclocking. The first and simplest is the CPU Internal Frequency setting, which resides alongside the previously mentioned FSB:SDRAM:PCI Frequency ratio setting in the 'Advanced' option of the BIOS. As can be seen from the above screenshot, this allows us to set the internal speed of the CPU to either manual or one of the overclocked settings. If your motherboard has the same setting, simply select the next highest clock speed below the manual setting, which in the case of our Celeron 667MHz would be 700MHz. Then

step five: Up the Bus (b)



```
CPU Internal Frequency
CPU Frequency Multiple
FSB:SDRAM:PCI Freq. Ratio

CPU Vcore
CPU Level 1 Cache
CPU Level 2 Cache
CPU Level 2 Cache ECC Check
BIOS Update
PS/2 Mouse Function Control
USB Legacy Support
OS/2 Onboard Memory > 64M
▸ Chip Configuration
▸ I/O Device Configuration
▸ PCI Configuration
▸ Shadow Configuration
```

Item Specific Help

Recommendation:
If trying to overclock FSB frequency up to 145MHz or above, select [133:100:33] for the FSB:SDRAM:PCI Freq. Ratio, and choose the appropriate FSB frequency from FSB/SDRAM/PCI Freq. field.

save your BIOS settings and head on to step 6 to try and load your OS.

If your motherboard does not have the CPU Internal Frequency setting, you will need to adjust the FSB:SDRAM:PC Frequency, which can also be found under the 'Advanced' options within your BIOS. This basically raises your FSB in small MHz increments and will initially display the FSB that you set in the FSB:SDRAM:PCI Frequency Ratio setting. So for a Celeron it should initially show the settings: 66:100:33.

The first number of these is the FSB speed. Increase this number by the smallest MHz increment, which will usually be 1 or 2 MHz increments. This is why a motherboard with smaller FSB MHz increments is most desirable for overclocking. Then save all BIOS settings before rebooting into step 6.

> **"... when it comes to removing heat this beast is hard to beat."**

66:100:33

Should you play with your VIO (Voltage I/O) setting?

Most motherboards now come with a setting that allows the user to manually adjust the voltage that is supplied to the DRAM, chipset, AGP port and PCI ports. They usually have 3 different settings of 3.3V, 3.4V and 3.6V, with the default setting being either 3.3V or 3.4V. Many overclockers have reported added overclocking capacity when this setting is raised to 3.6V, although this does increase the risk of damaging your other components (one of the main disadvantages of FSB overclocking). But depending on the quality of your components, especially your DRAM, this added voltage may be too much and will actually lower the maximum speed you can run your computer at. Some users have found that lowering the VIO from their default of 3.4V to 3.3V has helped in their overclocking endeavours. So our advice to you is to experiment and find the optimal setting for your specific system.

Socket 370 compatible Heatsink Fan Roundup

These fans were tested on our reference CUSL2 motherboard whilst running a PIII-1GHz at 1.7V. 3DMark2000 Pro was left in looping demo mode for 30 minutes before the temperature was taken, using ASUS's own Asus probe temperature monitoring software (Motherboard monitor 5 was not used as it reported temperatures approximately 10C lower than the BIOS.)

Alpha PAL6035

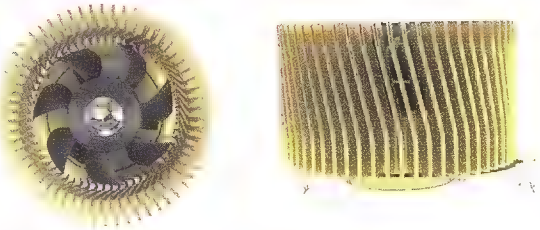
atomic 3rd

We were surprised last month at how poorly this renowned cooler performed in our Socket A roundup, so it wasn't much of a revelation when we saw it come in last for the Socket 370 tests. We are still perplexed as to why this Alpha has such a great reputation.

Price: $80, Motherboard temp: 32C, CPU temp: 55C, Ambient temp: 25C

Thermaltake Golden Orb

atomic 2nd

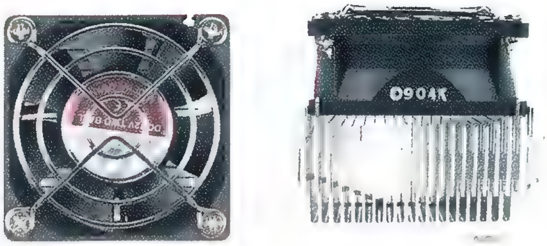


We like our orbs at atomic. Why wouldn't we when this $35 heatsink left the Alpha in the dust and was far quieter than the FOP38? The latching mechanism was a little tricky to initially fit, whilst some folks might have problems mounting them on certain motherboards, but other than this the Golden Orb was a quiet and efficient cooler.

Price: $35, Motherboard temp: 32C, CPU temp: 47C, Ambient temp: 25C

Global Win FOP38

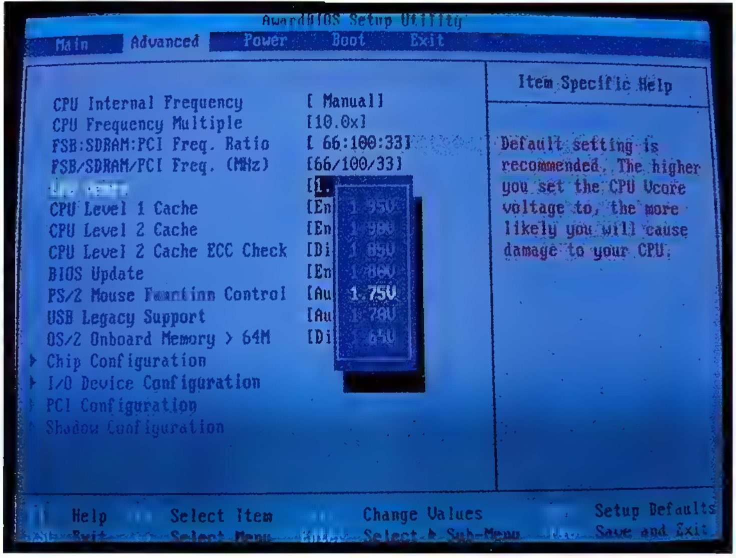
atomic 1st



The winner of last months HSF roundup takes the cake once again as top cooler in our Socket 370 roundup. Even though the room temperature rose a degree while testing this HSF, it still came out with the lowest CPU temperature of the lot. Unfortunately it is a very noisy fan, but when it comes to removing heat this beast is hard to beat.

Price: $45, Motherboard temp: 32C, CPU temp: 45C, Ambient temp: 26C

step six: Engage



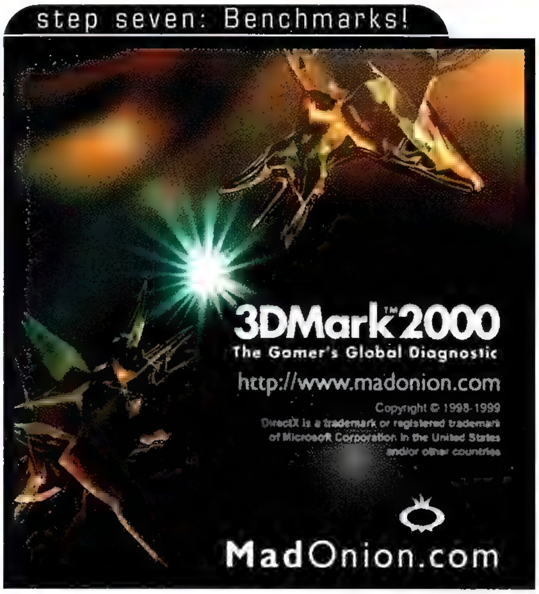
```
AwardBIOS Setup Utility
 Main   Advanced   Power   Boot   Exit

 CPU Internal Frequency          [ Manual]        Item Specific Help
 CPU Frequency Multiple          [10.0x]
 FSB:SDRAM:PCI Freq. Ratio       [ 66:100:33]     Default setting is
 FSB/SDRAM/PCI Freq. (MHz)       [66/100/33]      recommended. The higher
 [illegible]                     [1.              you set the CPU Vcore
 CPU Level 1 Cache               [En              voltage to, the more
 CPU Level 2 Cache               [En              likely you will cause
 CPU Level 2 Cache ECC Check     [Di              damage to your CPU.
 BIOS Update                     [En
 PS/2 Mouse Function Control     [Au   1.75V
 USB Legacy Support              [Au
 OS/2 Onboard Memory > 64M       [Di
▶ Chip Configuration
▶ I/O Device Configuration
▶ PCI Configuration
▶ Shadow Configuration

   Help      Select Item       Change Values          Setup Defaults
   Exit      Select Menu       Select ▶ Sub-Menu      Save and Exit
```

ⓘ It's time to turn the PC back on and see whether you can successfully load your OS of choice. If the PC hangs before the OS is loaded your CPU isn't able to handle the speed increase you have made. Simply reboot, enter the BIOS and turn your FSB or CPU Internal Frequency setting back down a notch. You could also try increasing the Vcore voltage in 0.05 increments at this stage, although this doesn't seem to have such an impressive effect on overclocking as it does on AMD's chips. If your PC hangs even before the part of the BIOS that says "hit delete to enter setup", don't worry; you'll still be able to adjust these settings. Most newer motherboards will automatically revert to the default speed for the CPU in this case, otherwise a specific key is depressed upon booting to revert to default settings within the BIOS. In a worst case scenario you may have to reset your CMOS - consult your manual for this procedure. Increase the Vcore or lower the FSB or CPU Internal Frequency setting until you are able to successfully boot into your OS of choice.

step seven: Benchmarks!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MadOnion.com

ⓘ Now is the time to see if your overclocked CPU can handle more complex tasks than simply loading an OS. That's right, it's time for the benchmarks! Just as we said in last month's AMD overclocking journey, our current favourite for stability testing is 3DMark2000 Pro at high resolution with 32-bit colour and textures in looping demo mode. If you can loop this without crashing for a full 24 hours, you can be certain that your CPU is comfortable at its increased speed. Praise your CPU for its additional effort, then try and squeeze even more out of it.

If you do experience a crash whilst running the demo, there are 2 main causes:

- If it crashes immediately, it usually is an indication that the CPU can't handle its new speed. It may be a heat problem but generally immediate crashes are a sign of a too highly clocked CPU or a lack of voltage to the higher speed CPU. Follow the same procedures as step 6, that is, either increase the CPU Vcore or lower the FSB or CPU Internal Frequency setting until the looping demo mode runs successfully

Fractions can be fun

The speed that your AGP port runs at is determined by multiplying the FSB speed by the AGP multiplier. The AGP specification speed is 66MHz, so AGP multipliers of 1/2, 2/3, and 1/1 are most common. Some motherboards support manual adjustment of this ratio, but many automatically set it based upon the chosen FSB speed.

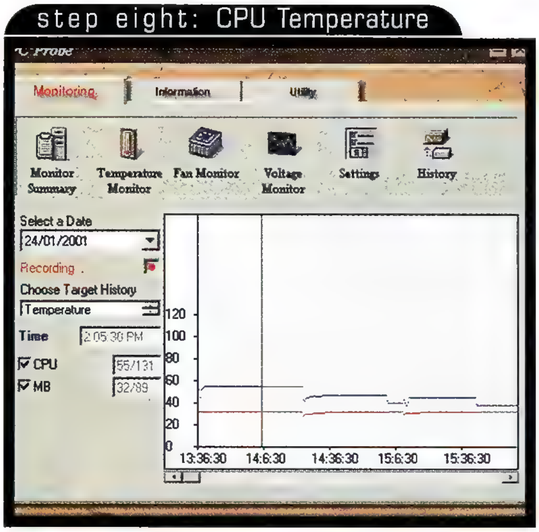
If your motherboard does allow manual selection of the AGP ratio, and you have overclocked via the FSB, you need to select the ratio that will keep your AGP running as close to 66MHz as possible. So if you are running with a FSB of 110MHz, the best AGP ratio would be 2/3 giving you an AGP speed of 73.3MHz. If you had the FSB set to 75MHz, then the optimal AGP ratio would be 1/1, as 75Hz is still closer to 66MHz than if the multiplier was set to 2/3, which would give an AGP speed of 50MHz.

The exact same principle applies to your PCI ports, but the specification speed for PCI ports is 33MHz, making settings of 1/2, 1/3 and 1/4 most common. If your motherboard does support manual adjustment of the PCI ratio, select the PCI ratio that will run your PCI ports as close to 33MHz as possible.

without any crashing over time.

- If the demo begins to loop successfully but soon crashes, the symptoms are pointing to a heat buildup problem. In this instance a better HSF (Heatsink/Fan) combination or added case cooling may solve the crashes. HSF's are quite cheap to purchase (see our Intel cooler roundup for our pick) and the difference between a stock HSF and an overclocker's model can be 50 to 100 MHz , sometimes even greater. In the meantime, lower the CPU Vcore or FSB/CPU Internal Frequency setting until you can run the looping demo for extended periods of time.

step eight: CPU Temperature



Select a Date 24/01/2001

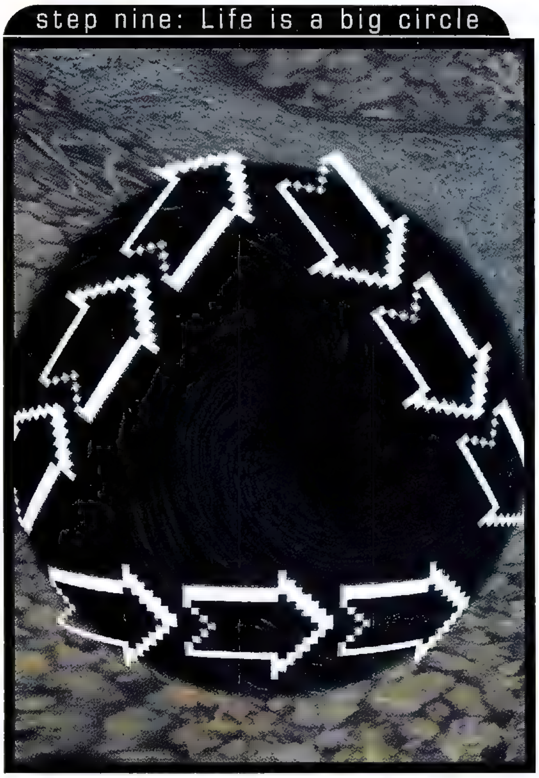
Choose Target History Temperature

Time 2:05:30 PM

☑ CPU 55/131

☑ MB 32/89

step nine: Life is a big circle



Stepping out in style

Intel produce many different variants of the same chip. After the original CPU is released further refinements are made to the chip design, which are then incorporated into a newer version of the same chip. These changes usually result in increased stability which can increase the overclocking capacity of the CPU. This process is referred to as stepping. In general it is best to get the most recent version of a specific CPU when overclocking, which at the moment is the cC0 variant. A full listing of the different steps for all Intel CPUs is available at www.intel.com.

ⓘ Whilst doing the previous steps it is wise to keep tabs on your CPU's temperature. We recommend Motherboard Monitor 5 (http://mbm.livewiredev.com) as it is easy to use, free to download and best of all comes with funky dashboard-like temperature gauges. In our experience the PIII and Celeron chips will not run stably above temperatures of around 58C, but your PC will begin crashing long before you reach CPU obliterating temperatures. If you notice temperatures rising above the recommended temperature for these chips, you can either:

- lower the CPU Vcore voltage - although this may mean you have to lower your FSB speed
- install a better HSF combination on the CPU
- install better case cooling that directs cool air directly to the CPU HSF

ⓘ Repeat steps 5 through to 8, slowly increasing your FSB/CPU Internal Frequency setting and CPU Vcore, and then test until you reach the ceiling of your chip's potential. If the added Vcore is above around 0.2V then you might have to think about a custom HSF to ensure your CPU doesn't fry in the next couple of years. Once your PC begins crashing to the point where added cooling or extra CPU Vcore voltage don't remedy the lockups, notch it back to the last successful setting. Keep 3DMark2000 Pro in looping demo mode for as long as possible to test system stability over extended periods of time. Then sit back, relax and be happy with the performance you have just gained for free, as well as the mounds of respect you'll receive from your computer buddies for being a l337 Ov3rc|0ck3r. ○

atomic RESULTS OF OVERCLOCKING

CPU	DEFAULT	MAX	INCREASE
PIII-933	933MHz	1071MHz	14.8%
Celeron 667	667MHz	880MHz	31%
Celeron 667	667MHz	930MHz	39.4%

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Please send all photos to:

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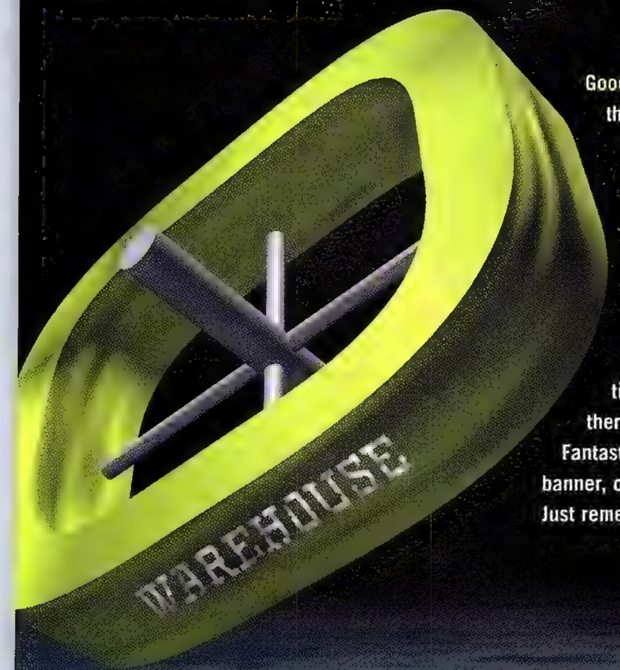
Closing date for receipt of entries is 17/3/01. Please enclose a stamped, self-addressed envelope if you want your pics back. Write your name and address on the back of the envelope.

atomic warehouse



Good to see you've made it this far, dear reader. By now you'll have read and memorised the expert guidance that comprises this tome (excluding the silly captions). You now know what you need – be it the CPU we recommended, or the video card that's our current fav, or even the silly but cool vibrating mouse.

But now what? You know you need this stuff, but we know you're thinking, "Where do I get it?" Please peruse the following pages, friend. There you will find bargain buys you've only dreamed about. We choose to call this collection of most excellent advertisements the 'atomic Warehouse'. The clever guy who thought up that name is still congratulating himself.

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Intel Pentium III-800EB/133 (S370)	$446
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9.1Gb Fujitsu U-160 7200rpm	$439
18.2Gb Fujitsu U-160 7200rpm	$710
9.1Gb Fujitsu U-160 10000rpm	$667
18.2Gb Fujitsu U-160 10000rpm	$1,082
36.2Gb Fujitsu U-160 10000rpm	$1,728
9Gb Quantum Atlas V U-160 LVD68	$396
18Gb Quantum Atlas V U-160 LVD68	$641
36Gb Quantum Atlas V LVD68	$1,085
9Gb Quantum Atlas 10K II U-160 LVD68	$499
18Gb Quantum Atlas 10K II U-160 LVD68	$767
36Gb Quantum Atlas 10K II U-160 LVD68	$1,205
73Gb Quantum Atlas 10K II U-160 LVD68	$2,581
9.2Gb Seagate Barracuda LVD68	$455
18.4Gb Seagate Barracuda U-160 LVD68	$652
36.4Gb Seagate Barracuda U-160 LVD68	$1,697
50.1Gb Seagate Barracuda LVD68	$1,993
9.2Gb Seagate Cheetah LVD68 10,000rpm	$528
18.4Gb Seagate Cheetah LVD68 10,000rpm	$737
36.7Gb Seagate Cheetah LVD68 10,000rpm	$1,264
73.4Gb Seagate Cheetah LVD68 10,000rpm	$2,325
18Gb Seagate Cheetah LVD68 15,000rpm	$959
9Gb IBM Ultrastar 36LZX U-160 10k LVD68	$467
18Gb IBM Ultrastar 36LZX U-160 10k LVD68	$711
36Gb IBM Ultrastar 36LZX U-160 10k LVD68	$1,222

FDD & STORAGE DEVICES

1.44MB, 3.5" Floppy Disk Drive	$28
LS120 SuperDisk 2x Int. IDE (oem)	$160
LS120 SuperDisk Ext. Parallel	$290
LS120 SuperDisk Ext. USB (iMac)	$305
LS120 SuperDisk Media	$18
Iomega 100M Zip Int. IDE (oem)	$117
Iomega 100M Zip Ext. Parallel	$234
Iomega 100M Zip Ext. USB	$224
Iomega 100M Zip Media	$24
Iomega 250M Zip Int. IDE (oem)	$199
Iomega 250M Zip Ext. Parallel	$339
Iomega 250M Zip Ext. USB	$395
Iomega 250M Zip Media	$30
Iomega 2GB Jaz Int. SCSI	$597
Iomega 2GB Jaz Ext. SCSI	$685
ORB 2.2GB Int. IDE Drive (oem)	$297
ORB 2.2GB Int.SCSI Drive (retail)	$347
ORB 2.2GB Ext.SCSI Drive (retail)	$400
ORB 2.2GB Ext. USB Drive (retail)	$422
ORB 2.2GB Disk Media	$64
ORB 5.7GB Int. IDE Drive	$601
ORB 5.7GB Ext. Firewire Drive	$829
ORB 5.7GB Disk Media	$100

VIDEO & GAMES CARDS

4M Eagle S3 Trio 32/2X AGP VGA Card	$50
8M Eagle S3 Trio 32/2X AGP VGA Card	$59
16M Eagle TNT2 Vanta AGP	$100
32M Eagle TNT2 Vanta AGP	$113
32M TNT2 M64 AGP w/ TV Out	$133
32M TNT2 M64 PCI	$152
32M TNT2 M64 PCI w/ TV Out	$172
32M Eagle Geforce II MX	$199
32M Asus V7100 GeForce II MX TV Out	$281
32M Asus V7100 GeForce II MX 2VID	$307
32M Asus V7700 GeForce II GTS DDR Pure	$515
32M Asus V7700 GeForce II GTS DDR TV Tuner	$640
32M Asus V7700 GeForce II GTS DDR Deluxe	$539
64M Asus V7700 GeForce II GTS DDR Pure	$839
64M Asus V7700 GeForce II GTS DDR TV Tuner	$860
64M Asus V7700 GeForce II GTS DDR Ultra	$1,041
32M ATI Rage Fury Pro AGP VIVO (oem)	$255
64M ATI Rage Fury MAXX AGP	$255
32M ATI All-in-Wonder 128 PCI	$453
32M ATI All-in-Wonder 128 Pro AGP	$496
32M ATI Radeon DDR AGP (oem)	$253
64M ATI Radeon DDR VIVO AGP (oem)	$721
64M ATI Radeon DDR VIVO AGP (Retail)	$841
32M Creative Blaster GeForce PRO DDR	$499
32M Creative Blaster GeForce II GTS	$533
32M Creative Blaster GeForce II MX	$285
64M Creative Blaster GeForce II Ultra	$908
32M Leadtek Winfast Geforce II MX (oem)	$237
32M Leadtek Winfast Geforce II MX	$282
32M Leadtek Winfast GeForce II MX Dual	$370
32M Leadtek Winfast GeForce II GTS TV	$563
64M Leadtek Winfast GeForce II GTS TV	$752
64M Leadtek Winfast GeForce II GTS TV Pro	$853
64M Leadtek Winfast GeForce II GTS Ultra	$1,041
32M Millenium G400 Dual Head MAX	$508
16M Millenium G400 Marvel TV/DVD	$756
16M Millenium G450 Dual Head SDR (oem)	$208
TV Out Cable for G450 SDR	$42
16M Millenium G450 Dual Head DDR (oem)	$265
32M Millenium G450 Dual Head DDR (oem)	$357
32M Voodoo 4 4500 AGP	$329
32M Voodoo 4 4500 PCI	$346
64M Voodoo 5 5500 AGP	$578
64M Voodoo 5 5500 PCI	$670
16M Elsa Appian Gemini PCI	$818
16M Elsa Appian Gemini AGP/ATX	$818
32M Elsa Jeronimo 2000 2x Permedia3 PCI	$1,841
32M Elsa Jeronimo 2000 2x Permedia3 AGP	$1,841
64M Elsa Jeronimo 2000 dual Permedia 3 AGP	$2,302
32M Elsa Gladiac GeForce II GTS AGP	$677
64M Elsa Gloria III AGP	$2,964
32M Elsa Synergy III AGP	$1,302
32MB Hercules 3D Prophet w/ TV Out	$394
32MB Hercules 3D Prophet DDR-DVI	$487
32MB Hercules 3D Prophet II MX	$245
32MB Hercules 3D Prophet II GTS	$628
64MB Hercules 3D Prophet II GTS	$653
64MB Hercules 3D Prophet II GTS PRO	$665
64MB Hercules 3D Prophet II Ultra	$877
16M 3Dlabs Oxygen VX1 Glint R3 AGP	$251
32M 3Dlabs Oxygen VX1 Glint R3 AGP	$446
32M 3Dlabs Oxygen VX1 Stereo AGP	$1,068
32M 3Dlabs Oxygen GVX1 Glint R3 AGP	$1,184

MONITORS

Mitsubishi D/view 1554i 15", .28 1024x768	$257
Mitsubishi D/view 1770f 17", .27	$385
Mitsubishi D/view 17NF 17", .25 (Flatron)	$668
Mitsubishi D/view 19NF 19", .25 (Flatron)	$1,126
Mitsubishi D/view 2107 21", .26 1600x1280	$1,769
Acer 54E 15", .28 1024x768 66Hz	$257
Acer 771 17", .27 1280x1024 60Hz	$386
Acer 99C 19", .26 1600x1200 75Hz	$840
Acer 211A 21", .26 1600x1200 75Hz	$1,546
Fujitsu 17", 1280x1024 60Hz	$364
KDS 17" Flat Monitor	$588
Auriga ColorPro 17D, 17" .25 (Flatron)	$550
Auriga ColorPro 19D, 19" .25 (Flatron)	$887
"CTX PR711 17", .24 1600x1280 + 2 USB (Flatron)	$683
CTX PR705 17", .24 (Flatron)	$596
Hitachi CM615 17", .24 1280x1024	$395
Hitachi CM625 17" (Flat Trinitron)	$658
Hitachi CM715 19", .22 1600x1200	$771
Hitachi CM771 19", .22 1800x1350 (Flat)	$878
Hitachi CM811 21", .22 1600x1280	$1,619
Hitachi CM813 21", .22 1600x1280	$1,770
LG 795FT Flatron 0.25 17"	$719
LG 995E Studioworks 19"	$850
NEC V520 15" Monitor 1280x1024, 0.28	$315
NEC V720 17" Monitor 1280x1024, 0.28	$480
NEC V920 19" Monitor 1600x1200	$829
NEC E1100 21" Monitor 1600x1200	$1,781
NEC P1250+ 21" Monitor 1800x1440, 0.25	$1,956
Panasonic E70i 17" Digital Color 0.27	$433
Panasonic PF90 19" Digital Color 0.22	$1,082
Panasonic S110i 21" Color 1600x1240, 0.25	$1,562
Panasonic P110i 21" Color 1800x1440, 0.25	$1,737
Sony E100 15", .24-.25 (Flat Trinitron)	$435
Sony E220 17", .24-.25 (Flat Trinitron)	$721
Sony G400 19", .24-.25 (Flat Trinitron)	$1,246
Sony G500 21", .24 (Flat Trinitron)	$2,045
Viewsonic E653 15", .28 1280x1024	$302
Viewsonic PS775-2E 17", .26 1600x1200	$596
Viewsonic PF775 17", .25 1600x1200 Flat	$687
Viewsonic E70 17", .27 1280x1024	$385
Viewsonic M70 17", .27 1280x1024 MM	$464
Viewsonic E790 19", .26 1600x1280	$766
Viewsonic PF790 19", .25 1600x1200	$1,003
Viewsonic G810-4E 21", .25 1800x1440	$1,511
Viewsonic P815-4 21", .25 1800x1440	$1,805

LCD MONITORS

Acer FP450 14" LCD	$1,441
Acer FP558 15" LCD (Speaker + USB)	$1,860
Acer FP751 17" LCD (Speaker + USB)	$3,560
Acer FP855 18" LCD	$5,564
Hitachi DT3141 14.1" TFT Monitor	$1,725
Hitachi CML151XW 15" TFT Monitor	$1,910
Hitachi CML170SXW 17" TFT Monitor	$2,994
LG 15" SW570LS LCD Monitor	$1,724
LG 18" W880LC LCD Monitor	$6,138
Keycorp 12.1" TFT Monitor	$1,269
Keycorp 15.1" TFT Monitor	$1,786
Keycorp 18.1" TFT Monitor	$5,532
Mitsubishi TFT 15" DV150 1024x768	$1,821
Mitsubishi TFT 18" RDT180S 1280x1024	$5,291
NEC 15" LCD 1525V Monitor 1024 x 768	$2,072
NEC 15" LCD 1525M Monitor 1024 x 768, MultiMedia	$2,283
NEC 18" LCD 1810 Monitor 1280 x 1024	$6,159
NEC 20" LCD 2010X Monitor 1280 x 1024	$9,509
Panasonic 15" LC50S LCD 0.25	$1,995
Panasonic 19" LC90S LCD 0.25	$7,248
Sony 15" SDMM51 TFT Monitor	$2,308
Sony 15" SDMN50 TFT Monitor	$2,937
Sony 18" CPDL181 TFT Monitor	$6,032
Viewsonic 15" LCD VE150 1024x768	$1,804
Viewsonic 15" LCD VP151 1280x1024	$3,080
Viewsonic 18" LCD VP181 1600x1200	$5,609

PROJECTORS

Viewsonic PJ820 SVGA Projector	$7,142
Viewsonic PJL855 SVGA Projector	$6,333
Viewsonic PJ860 SVGA Projector	$8,527
Viewsonic PJL1035 XGA Projector	$8,527
Hitachi CPS220 SVGA 800x600 800lum	$5,355
Hitachi CPS840 SVGA 800x600 900lum	$5,643
Hitachi CPX940 XGA 1024x768 1000lum	$7,838
Hitachi CPS860 SVGA 800x600 1700lum	$8,276
Sony CPJ-D500 SVGA Projector 640x480	$3,086
Sony Ultra Compact LCD Projector	$5,653

CASINGS

Deluxe Midi Tower ATX 250W	$61
AOpen Midi Tower ATX KF45B	$83
AOpen Desktop ATX HX95	$131
AOpen Full Tower ATX HX08	$193
Intel Chenbro Chassis for Pentium 4	$303
Macase Midi Tower ATX KA-80 250W	$124
Macase Midi Tower ATX KA-80 300W	$144
Macase Midi Tower ATX KA-580WP 250W	$131
Macase Desktop ATX	$129
Macase Full Tower ATX KA-C-80 300W	$261
Macase KI-P20 2U Rackmount ATX 300W	$584
Macase 8-Bay Ext. SCSI -50 CDROM Tower	$572
Macase 14-Bay Ext. SCSI -50 CDROM Tower	$935
750 SuperO 300W Slot1/2 Server Chassis	$497
760 SuperO 300W Slot1/2 Server Chassis	$593
760 SuperO 400W Slot1/2 Server Chassis	$617
801 SuperO Deluxe Dual PIII/Xeon Chassis	$987
830 SuperO Deluxe Dual PIII/Xeon Chassis	$1,456
850 SuperO Deluxe Quad PIII/Xeon Chassis	$3,970
860 19" SuperO Rackmount Dual PIII/Xeon	$2,242
860 19" SuperO Rackmount Quad PIII/Xeon	$3,056
5.25" External Case for IDE - USB	$185
3.5" External Case for SCSI-68	$151
5.25" External Case for SCSI-68	$158
2-Bay 5.25" Ext Case for SCSI-68	$234
2-Bay 5.25" Ext Case for SCSI-LVD68	$289
250W ATX Power Supply	$44
300W ATX Power Supply	$80

KEYBOARDS

Deluxe 104 - Keyboard PS/2	$15
Acer Accufeel Keyboard PS/2	$24
Honeywell Spacemate II Din-5&PS/2	$44
Honeywell Euroboard M-Media Din-5&PS/2	$65
Fujitsu Internet Keyboard PS/2	$37
KeyTronic Designer Keyboard PS/2 (Black)	$45
Logitech Internet Keyboard PS/2 (oem)	$50
Logitech C'less Keyboard + Mouse (oem)	$131
Logitech C'less Freedom Pro (K/b + Mouse) (oem)	$220
Microsoft Internet Keyboard PS/2 (oem)	$48
Microsoft Internet Keyboard Pro (oem)	$77
Microsoft Ergonomic Elite PS/2	$63
Microsoft Natural Keyboard Pro PS/2&USB	$115

MICE

A4+ 400dpi 2-Button PS/2	$8
A4+ 400dpi 2-Button Serial	$7
Browser Wheel Mouse PS/2	$15
Logitech Wheel Mouse PS/2 (oem)	$37
Logitech WingMan Gaming Mouse	$100
Logitech Cordless Wheel Mouse PS/2 (oem)	$80
Logitech Cordless MouseMan Wheel PS/2	$108
Microsoft 2-Button Mouse PS/2 (oem)	$18
Microsoft Trekker Mouse PS/2 (oem)	$18
Microsoft Intellimouse PS/2 (oem)	$44
Microsoft Intellimouse Optical USB&PS/2	$84
Microsoft Intellimouse w/ Intellieye	$70
Microsoft Intellimouse Explorer (oem)	$96
Logitech Trackman Marble Wheel USB&PS/2	$97
Logitech Trackman Marble FX Serial&PS/2	$147
Logitech Cordless TrackMan Wheel USB&PS/2	$136
Logitech Cordless TrackMan FX USB&PS/2	$182
Logitech Cordless TrackMan Live	$314

JOYSTICKS

Logitech WingMan Force 3D USB	$127
Logitech WingMan Strike Force 3D USB	$186
Logitech WingMan Force USB	$204
Logitech WingMan Formula GP	$129
Logitech WingMan Formula Force GP	$227
Microsoft Sidewinder Freestyle Pro USB	$129
Microsoft Sidewinder Force Feedback	$248
Microsoft Sidewinder Racing Wheel USB	$111
Microsoft Sidewinder Force Feedback Wheel	$274

CD ROM

44x IDE ATAPI CD-ROM Drive	$67
48x Fujitsu IDE CD-ROM Drive	$80
52x Creative IDE CD-ROM Drive	$80
32x Teac SCSI CD-ROM Drive	$164

DVD ROM

Pioneer 16x DVD 40xR IDE Bare Drive (oem)	$214
Pioneer 10x DVD 40xR SCSI Bare Drive (oem)	$328

CD REWRITERS

Plextor (12x10x32) IDE + Soft + Media	$721
Plextor (12x4x32) SCSI + Soft + Media	$766
Plextor (12x10x32) SCSI + Soft + Media	$888
HP 9140i (8x4x32) IDE	$376
HP 9350i (10x4x32) IDE	$463
HP 9500i (12x8x32) IDE	$556
HP 9600si (12x8x32) SCSI	$710
HP 8230e (4x4x6) Ext USB	$534
HP 9600se (12x8x32) Ext SCSI	$890
Acer (8x4x32) IDE + Soft + Media	$299
Acer (4x4x6) Ext USB	$464
Ricoh 7120A (12x10x32) IDE + Soft + Media	$443
Ricoh 8040A (4X4X20) IDE Slim (Notebook)	$651
Ricoh 8040S (4X4X20) SCSI Slim (Notebook)	$696
Ricoh 9060A (6x4x24x4) IDE DVD-CDRW	$500
Ricoh 9120A (12x10x32x8) IDE DVD-CDRW	$651
Sony 140E (8x4x32) IDE Bare Drive (oem)	$291
Sony 145E (10x4x32) IDE Bare Drive (oem)	$379
Sony 145S (10x4x32) SCSI Bare Drive (oem)	$420
Sony 160E (12x8x32) IDE Bare Drive (oem)	$472
Iomega Zip (12x4x32) Int IDE	$588
Iomega Zip (4x4x6) Ext USB	$472
Yamaha (8x8x24) IDE + Soft + Media	$404
Yamaha (8x4x24) SCSI Bare Drive (OEM)	$391
Yamaha (8x4x24) SCSI + Soft + Media	$445
Yamaha (8x8x24) SCSI + Soft + Media	$489
Yamaha (8x8x24) Ext SCSI + Soft + Media	$596
Yamaha (8x8x24) Ext Firewire + Soft + Media	$721
Blank CD-R 80-Minutes Laser	$2
Blank CD-RW Laser	$5

SOUND CARDS

Eagle 16 bit ESS 1938 (oem)	$26
Sound Blaster Vibra 128 (oem)	$45
Sound Blaster PCI-128 2-Channel (oem)	$55
Sound Blaster LIVE (oem)	$113
Sound Blaster LIVE DE 5.1	$191
Sound Blaster LIVE Platinum 5.1	$449
Diamond Monster Sound MX400 (oem)	$110
Guillemot Maxi Studio ISIS XL	$700

SPEAKERS

280W PMPO Stereo Power	$15
Zodiac Subwoofer Premium Stereo Speakers	$45
Altec Lansing ACS22 - 2p	$60
Altec Lansing ACS233 - 3p Subwoofer	$79
Altec Lansing ACS45.1 Power Cube - 3p	$165
Altec Lansing ATP3 Flatpanel -3p	$215
Altec Lansing ACS56 Gamers -5p Digital in	$290
Altec Lansing ACS48 Power Cube + - 3p	$265
Altec Lansing ADA305 USB Dolby P/L Srnd	$225
Altec Lansing ADA880 Dolby AC3 - 5p	$527
Cambridge PCWorks 3-p	$90
Cambridge FPS1000 4-p Surround	$153

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SINCE 1987

Cambridge FPS1500 4-p Surround Digital	$191
Cambridge FPS2000 4-p Surround Digital	$375
Cambridge DTT2500D 6-p Desktop Theater	$655
Cambridge DTT3500D 6-p Desktop Theater	$800
Logitech SoundMan Xtrusio DSR-100	$352
Yamaha YST/M100 Surround Speakers	$210
Yamaha YST/MS30 Subwoofer + Speakers	$123
Yamaha YST/MS35 Sub + Speakers USB	$136
Yamaha YST/MS55 Sub + Speakers USB	$255

SOFTWARES

MS Windows 98 Second Edition CD (oem)	$214
MS Windows Millenium Edition CD (oem)	$207
MS Windows 2000 PRO (oem)	$310
MS Windows 2000 Server + 5 User (oem)	$1,480
Microsoft NT Workstation 4.0 (oem)	$330
Microsoft NT Server 4.0 + 5 User (oem)	$1,275
Microsoft NT Server 4.0 + 5 User	$1,673
Microsoft NT Server CAL	$73
Microsoft B'Office SBS 4.5 + 5 Users (oem)	$2,515
Microsoft B'Office SBS 5 Users Licence	$484
Microsoft OFFICE 2000 S.B.E. (oem)	$401
Microsoft OFFICE 2000 PRO (oem)	$559
Microsoft OFFICE 2000 Standard Full Version	$957
Microsoft OFFICE SBE 2000 Full Version	$957
Microsoft OFFICE PRO 2000 Full Version	$1,148
Microsoft OFFICE Premium 2000 Full Version	$1,532
Microsoft Works Suite 2000 (oem)	$145
Microsoft Publisher 2000	$199
Adobe Photoshop 6.0 98/NT/ME	$1,366
Corel Draw 9 Full Version	$1,101
Corel Draw 10 Full Version	$1,188
Lotus Millenium Smart Suite for Windows	$49
M.Y.O.B. First Accounts	$187
M.Y.O.B. Asset Manager	$282
M.Y.O.B. Accounting	$375
M.Y.O.B. Accounting Plus (Payroll)	$539
M.Y.O.B. Premier Accounting	$997
M.Y.O.B. PowerPay	$470
M.Y.O.B. Digi-Till for Windows	$997
Symantec Norton Antivirus 2000 (oem)	$66

PRINTERS

Acer Fotoprisa 300P	$314
Brother HL-1240 12ppm 2M Laser	$518
Brother HL-1250 12ppm 4M Laser	$647
Brother HL-1270N 12ppm 4M Laser	$890
Brother HL-1660e 16ppm 8M Laser	$1,660
Brother HL-2060e 20ppm 8M Laser	$1,951
Brother MP-21C Portable InkJet Printer	$533
Brother MFC-970MC All-in-One Colour InkJet	$520
Brother MFC-7160C All-in-One Colour InkJet	$923
Brother MFC-9100C All-in-One Colour InkJet	$1,336
Brother MFC-4340 Fax/Printer/Copier Laser	$1,068
Brother MFC-8600 All-in-One Laser	$1,515
Samsung ML-4500 8ppm 600dpi	$431
Samsung ML-5200A 10ppm 1200dpi (+USB)	$602
Samsung ML-6060 12ppm 1200dpi	$772
Samsung ML-7050 17ppm	$1,437
Canon BJC-50 Portable (opt. Scanner)	$563
Canon BJC-85 Portable	$349
Canon BJC-1000SP	$120
Canon BJC-2100SP 5ppm	$148
Canon BJC-3000 (+USB)	$239
Canon BJC-4650 (A3) (opt. Scanner)	$393
Canon BJC-6200 8ppm (1440x720)	$350
Canon BJC-6500 8ppm (1440x720) (A3)	$594
Canon BJC-7100 (1200x600)	$471
Canon BJC-8200	$595
Canon BJC-5500 (A2)	$1,177
Scanner head for 50/80, 4300/4650	$117
Canon LBP800W 8ppm	$515
Canon LBP1000 Laser	$1,147
Canon LBP1760 17ppm (1200x1200)	$1,620
Canon MPC-20 Multifunction Photo BJ 4 in 1	$477
Canon MPC-50 Multifunction Photo BJ 4 in 1	$638
Canon MPL-60 Multifunction Laser 4 in 1	$1,170
Epson Stylus Color 480 (720x720)	$160
Epson Stylus Color 580 (1440x720) (USB)	$184
Epson Stylus Color 680 (2880x720) (+USB)	$303
Epson Stylus Color 760 (1440x720) (+USB)	$283
Epson Stylus Color 880 (2880x720) (+USB)	$500
Epson Stylus Color 900 (2880x720) (+USB)	$634
Epson Stylus Color 980 (2880x720) (+USB)	$700
Epson Stylus Color 1160 (A3+)	$777
Epson Stylus Color 3000 (A2)	$2,039
Epson Stylus Photo 720 (1440x720) (USB)	$326
Epson Stylus Photo 890	$602
Epson Stylus Photo 1270 (A3+)	$838
Epson Stylus Photo 2000P (A3+)	$1,797
Epson FX880 9P D/M 455cps 80c	$712
Epson FX980 9P D/M 563cps 80c (S/P)	$777
Epson FX1180 9P D/M 410cps 136c	$850
Epson FX2180 9P D/M 500cps 136c	$966
Epson LQ300 24P D/M 240cps 80c (S/P)	$346
Epson LQ570+ 24P D/M 269cps 80c	$564
Epson LQ670 24P D/M 300cps 80c	$671
Epson LQ870 24P D/M 330cps 80c	$834
Epson LQ2080 24P D/M 400cps 136c	$752
Epson LQ2180 24P D/M 480cps 136c	$1,104
Epson DLQ3000	$1,685
Epson DFX5000+ 9P H/S 560cps 136c (S/P)	$3,198
Epson DFX8000	$4,703
Epson EPL-5700L	$635
Epson EPL-5800	$874
Epson EPL-N1600 16ppm	$1,496
Epson EPL-N2050	$2,358
Epson EPL-N2000 20ppm (A3) (N/W)	$3,037
Lexmark Z11 Colour (1200x1200)	$132
Lexmark Z31 Colour (1200x1200)	$162
Lexmark Z32 Colour (1200x1200)	$186
Lexmark Z42 Colour (1200x1200)	$279
Lexmark Z52 Colour (1200x1200)	$408
HP DeskJet 350CBI (Portable)	$540
HP DeskJet 640C	$178
HP DeskJet 840C	$271
HP DeskJet 930C	$322
HP DeskJet 950C	$439
HP DeskJet 970Cxi	$708
HP DeskJet 990Cxi	$792
HP DeskJet 1125C (A3)	$583
HP DeskJet 1220C (A3)	$860
HP DeskJet 2000C	$844
HP DeskJet 2500C	$1,928
HP OfficeJet 725 4 in 1	$548
HP OfficeJet R65 4 in 1	$910
HP OfficeJet T45 4 in 1	$641
HP OfficeJet T65 4 in 1	$733
HP OfficeJet G55 All in 1	$934
HP OfficeJet G85 All in 1	$1,398
HP OfficeJet G95 All in 1	$1,743
HP OfficeLaser 3150 4 in 1	$1,276
HP LaserJet 1100 8ppm	$737
HP LaserJet 2100	$1,289
HP LaserJet 2100M	$1,464
HP LaserJet 2100TN	$1,725
HP LaserJet 4050	$2,094
HP LaserJet 4050N	$2,634
HP LaserJet 4050TN	$3,154
HP LaserJet Colour 4500	$5,050
HP LaserJet 5000 A3	$2,806
HP LaserJet 8000	$4,509
Kyocera FS-1000	$623
Kyocera FS-1200	$1,046
Kyocera FS-1750	$1,595
Kyocera FS-3750	$1,995
Kyocera FS-5900C	$4,080
Kyocera FS-7000+	$3,891
Kyocera FS-9000	$4,988
Panasonic KX-P6100	$308
Xerox DocuPrint P8ex 8ppm	$415
Xerox DocuPrint P1202 12ppm	$689
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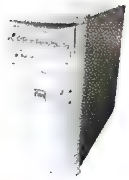

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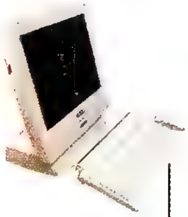

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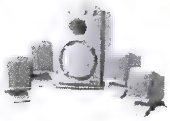

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Intel Pentium/Celeron Processor
GA-6VXC7-4XAGP Mainboard
Intel Fan HSF
128 MB RAM
32 MB Geforce 2 MX
20 GB Seagate Hard Drive
15” LG Monitor
AOPEN 250W Case
(AMD Certified)
1.44 FDD
52x CD-ROM Drive
Creative PCI 128 Vibra
480 Watt Stereo Speakers
WIN 98 Keyboard
PS2 Mouse
Windows ME on CD
Int 56k V.90/Flex Modem

Celeron 667 Mhz	**$1665**
Celeron 733 Mhz	**$1730**
Pentium !!! 800EB	**$1855**
Pentium !!! 866	**$1920**
Pentium !!! 933	**$2025**
Pentium !!! 1000	**$2095**

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Upgrade to ASUS GF V6800 +$295

Notebooks

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P88TF-PENTIUM III 500, 64 MB RAM, 6G HDD, 56K INT MODEM, 24X CDROM, FDD, 13.1” TFT, LI ION, WIN98, CASE
$2795

TOSHIBA

All Toshiba Models Available, here are some of our specials.

Satellite Pro 4310CDT C600, 64M, 6GiG 24XCD, **13.3”TFT,** Win98, 56K
$3045

Satellite Pro 4320DVD PIII600 64M, 10GiG, **6XDVD,** 13.3”TFT Win98 56K
$3745

COMPAQ

All Compaq models available, here are some of our specials.

Presario 1200 **C566,** 64M, 5GiG, 24Xcd, 12.1” HPA, 56K, win95/98
$2055

Presario1200 **PIII650** 64M, 5GiG, 24X CD, 13.3” TFT, 56K, Win98
$2899

ARC Computer Special Prices*, Call for More !!!

Pentium !!! 800EB Mhz	$385
Pentium !!! 866 Mhz	$420
AMD Duron 700 Mhz	$122
AMD K7 Athlon T-Bird 900 Mhz	$318
Thermal Take Dual HSF	$ 49
GA 7ZX (Duel Bios) M/B	$245
PC133 All in one M/B	$160
GA 6VX7+ M/B	$150
56k int Modem	$ 30
56k int Netcom Modem	$ 41
56k External Serial Modem	$ 85
20 GB Hard Disk Drive	$199
Cordless Internet Keyboard	$ 75
52x CDROM Drive	$ 68
16x Pioneer DVD	$199
RICOH 8x8x32 with Nero 5	$295

Sony 140E 8x4x32 (4M Buffer)	$253
Adaptec Easy CD Creator with Sony 140E	$ 27
Blank 74 Min CD	$0.80
Blank 80 Min CD	$1.00
Blank 74 Min CDRW	$2.65
Creative SB PCI 128 Vibra	$ 37
Creative SB PCI Live	$ 93
32 MB TNT2 M64 AGP	$100
32 MB Geforce 2 MX	$185
32 MB Geforce 2 MX with TV OUT	$195
Winfast LeadTek GeForce 2 MX with TVOUT	$295
140Watt Speakers	$ 7
17”inch LG 775N Monitor	$350
ATX MIDI (Small) 250 Watt	$ 40
ATX MIDI (BIG) 250Watt	$ 45
AOPEN 300 Watt Power Supply	$ 99
128 MB PC133 SDRAM	$ 95
64 MB PC133 SDRAM	$ 55

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* CERTAIN PRODUCTS COVERED BY MANUFACTURER WARRANTY
* ALL PRICES INCLUDE GST *SOME PRICES ARE CASH ONLY
* PRICE MATCHING ON SYSTEM'S & SPECIALS IS STRICTLY CASH ONLY

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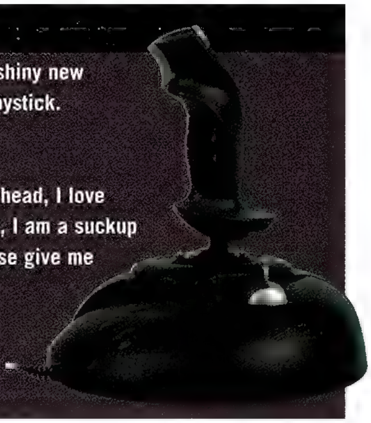
SAT:	9:30AM - 3:00PM
SUN:	CLOSED

post apocalypse

Tell us what you think, via email or snail mail, on your direct line to atomic headquarters

Letter of the month



This month our LOTM author receives a shiny new Microsoft SideWinder Force Feedback Joystick.

Dear dear dear atomic,
I love you guys and want to give you all head, I love everything and everyone about your mag, I am a suckup by profession BTW. Please, please, please give me LOTM and I will love you more!
PS: can we be best friends?
Aquilae
Email

> **"I found refreshing the lack of a colourful coaster glued to the front full of useless demos ..."**

Got the Blues

I am very pleased to have a totally (almost) hardware related magazine. I did, however, notice a misleading claim. On page 4, it says "The world's first blue video card...Too good." To my information, Gigabyte have previously released several blue products, including video cards and mainboards. I myself own a Gigabyte TNT2 card.

I'll leave it as that. Sorry to be an ass for writing for a small thing like that. Once again, thank you for the hardware-dedicated magazine; I will definitely be subscribing. Good luck to you for the future.

Julian Singson
Email

Several readers have pointed out the blue graphics card faux pas. What we meant to say was the world's first all-blue video card. The Gigabyte cards we have seen are a sexy blue, but they don't go the extra step to incorporate blue heatsinks as well.

Fontastic!

The format of the mag is excellent. Even the font rocks! I loved the case mods page (it's about time a mag had this). The reviews are unbiased and straight to the point. The tutorial was highly detailed as was the feature article.

Basically what I'm trying to say is that I love the mag and I can't wait for the next issue. Keep up the great work.

Owen
Email

Maximum Power Technology

First up, congratulations on a truly magnificent technology magazine. I say technology because rather than following the usual tired and boring PC magazine format you have tried something different that spans computer technology over a wide range of genres. I found refreshing the lack of a colourful coaster glued to the front full of useless demos that try so hard to destroy my carefully constructed pooter, (I pay for monthly Internet access for a reason). I also enjoyed and utilised a lot of your tips and tricks for Windows which were shitloads more use to me than how to construct a macro in Word to show all the different fonts available or some such crap.

Tim Boxall
Email

Pricing policy

Just finished reading issue one of your magazine, and to say the least I am impressed. Great quality in both the presentation and the content of the articles. Please, keep it up; there are not enough computer magazines in Australia with an emphasis on performance. But I would like to make a few suggestions. With your reviews, could you please give us the recommended retail price of the system/component/program your reviewing so that we can now what to expect price wise.

As well as plain out right performance-at-all-costs components, could your reviews tell readers which components/systems give a really good 'bang for your buck', giving good performance for an even better price.

Thank you for giving us a very enjoyable read.

Adam Dunning
Email

We are definitely keeping in mind the price issue. All our hardware reviews now feature a recommended retail price (although we still

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recommend you hunt around for the best deals and bear in mind that pricing for some items such as RAM will fluctuate highly depending upon the current market forces). As part of our SFX feature in this issue, on page 66, we focus heavily on the price performance issue of the current range of video cards.

Doctor Claw

I must thank you for the Claw review (nice touch with the hardware elevation views). We have addressed two of your major concerns in the new model so who says gamers/magazines in Australia cannot control the direction of hardware that is sold worldwide!

Jason Ferraro
Ferraro Design

|N|)3(|P|-|3R48|3?

Everybody's a critic, of course, so I won't get up your nose with any detailed literary review, except to say atomic was an enjoyable and informative read and is a sight better than any of the other computer magazines I've read recently. Your review of CounterStrike was creditably two-eyed I thought! I just about understood the |337 stuff but got thoroughly lost in the binary; a possible alternative that less space could be ASCII.

Humpers
Randwick, NSW

Forum Post of the Month
www.atomicmpc.com.au

This month our post of the month author receives a shiny new Microsoft Strategic Commander.

In fairness to the atomic crew, "Who cares about console crap?". The answer is a far greater majority than those that care about fine-tuning PCs piece by piece. Of course, this is a mag for hardware freaks with a focus on the PC, but considering consoles are basically just custom made PCs designed purely for gaming, surely that makes the information relevant and potentially interesting to a lot of the readers. If nothing else, if you understand the hardware architecture of the next gen consoles, you'll be able to silence the endless droves of kids who argue about which system is more powerful by just telling them the facts straight out... And that's a silence I'm sure we'd all welcome ;)

Armand

History lessons

Being a novice when it comes to building hardware, I found your articles both easy to understand and compelling to try out. The brief histories you gave about the subject matter before the main body of the articles really helped clarify what was being discussed. I have found this to be different from most mags because they assume the reader is aware of the previous incarnations of a product or the superseded technology.

Antal Peregi
Email

Love those LANs

Due to the nature of my job I was privy to see the first edition of the atomic magazine before anyone else from the public got their eyes on it. Yes that's right, I am one of the printers who helped put your huge magazine to paper and into magazine format! From the beginning of printing I've had this sort of feeling this magazine will go far. Of all the magazines I buy, this one will and does cater for my likes in the computer scene - hardware. I hope you keep up the high quality of the magazine content, it's about time there was a decent magazine around worth buying.

My other pastime is the local LAN party, and was wondering if you will be including any articles regarding the LAN parties available around the countryside and what they have to offer? As you are no doubt well aware, the LAN scene has become GIGANTIC over the last 12-18 months and it seems like everyone is getting involved in them. We believe we have the best value LAN to be found.

- All weekend – 24 hours straight
- 2 free barbeques – All meat and drinks etc. supplied free.
- A more social atmosphere
- Tournaments and giveaways/prizes
- Major sponsorship

You can find info on the Adelaide LAN Party Association at: - www.chariot.net.au/~voodoo

Voodoo
Email

Voodoo, we at atomic are big LAN party buffs, from the ten mate get togethers to the big scale 'megaLANs' like MPU, Shafted and QGL. We jumped at the chance of being the official magazine sponsor of AusGamers (www.ausgamers.com) in order to give the best support we can to the LAN community.

Last word

We look forward to hearing from you over the next month. Please bear in mind that letters may be edited for clarity and space considerations.

Send your questions to post@atomicmpc.com.au or by post to:

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The LAN experience

Attending LANs can be a confusing and traumatic ordeal. Most first time LAN attendees are under the mistaken impression that they are going to be playing games, however this is only a small part of the story.

LANs are all about attitude. Making a good appearance at a LAN can make or break the gaming reputation of both yourself and your clan.

As part of our service to atomic readers here is a ten-step guide to attending LANs, designed to avoid the embarrassment of looking like a LAN newbie.

> **"Every computer needs to have roughly 2GB of prOn"**

1) When arriving at a LAN, set up your computer and take the case off, even if you are running an underclocked 486.

2) Make sure you a running a DHCP server, the cries of "who keeps stealing my IP" will accompany the instant respect from fellow LAN goers and organisers.

3) Beverage consumption at LANs works off a simple principle. Find your favourite caffeine based beverage. On the side should be a recommended daily dose. Triple it.

4) There are only two games currently played at LANs, Quake 3 and Counterstrike. When playing Quake 3 on your 1GHz Athlon with GeForce2 combo you must run it at 640 x 480 resolution with all detail settings at minimum. When playing Counterstrike anyone you kill is a 'newbie', and anyone who kills you is obviously cheating.

5) Every computer needs to have roughly 2GB of prOn. This need never be viewed; it is solely for leaching over the course of the LAN.

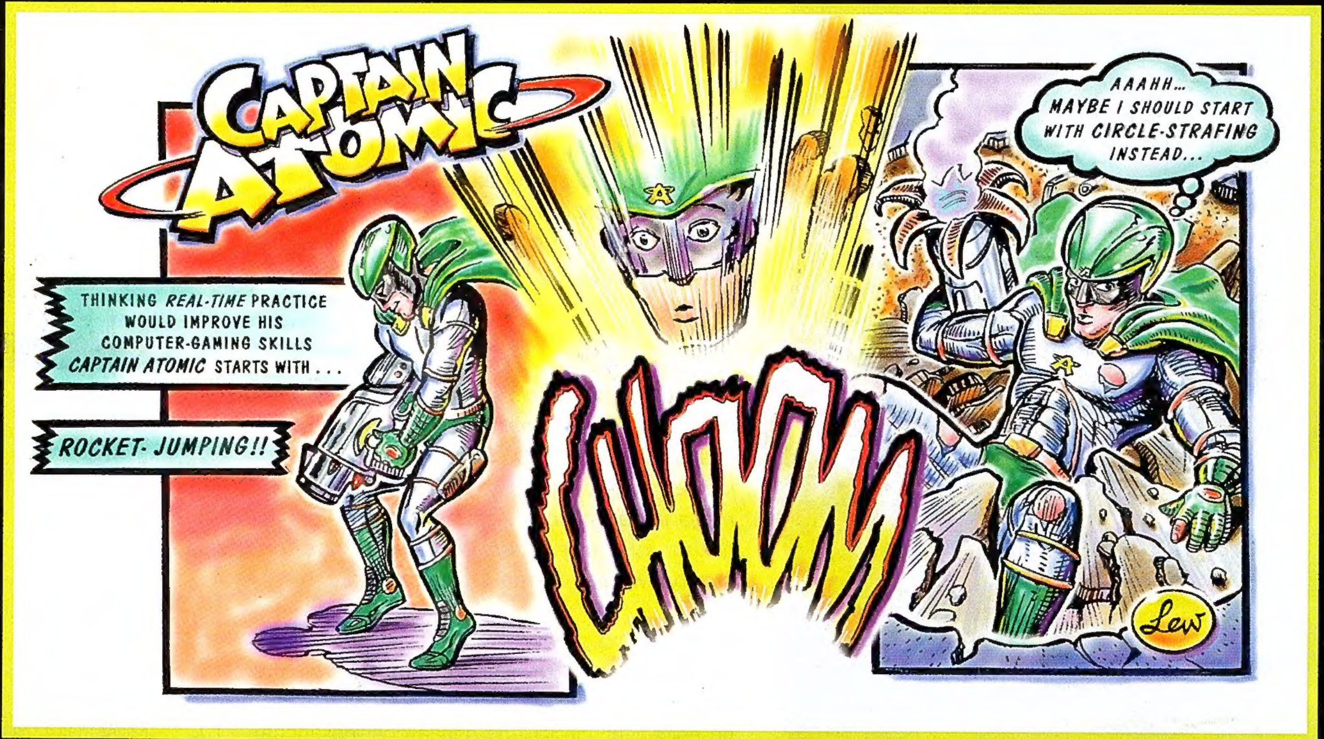
6) Your computer is never idle, even when you are off getting food, it must be running an FTP server, firewall, FTP client and several DivX ;-) movies as a bare minimum.

7) RAM thieves are everywhere, always keep an eye on your computer and preferably carry some sort of concealed weapon at all times. Vigilance is the key.

8) Salad has no place at a LAN.

9) There is only one female gamer in existence. Do NOT be scared if you see her, just back away slowly and return to your computer as if nothing happened, and above all else, avoid making any eye contact.

10) There may be a temptation to wear headphones for the convenience of others. This is not necessary. What you need is the loudest set of speakers possible, coupled with a 12 inch Subwoofer. This is perfect for spending the day impressing all and sundry with your extensive collection of Limp Bizkit mp3s.


CAPTAIN ATOMIC
THINKING REAL-TIME PRACTICE WOULD IMPROVE HIS COMPUTER-GAMING SKILLS CAPTAIN ATOMIC STARTS WITH . . .
ROCKET-JUMPING!!
WHOOM
AAAHH... MAYBE I SHOULD START WITH CIRCLE-STRAFING INSTEAD...
Lew

DVI-Out
TV-Out
64MB DDR RAM
GeForce2 Ultra™
AGP 4X/2X
PowerDVD™

Products available from Electronic Boutique,
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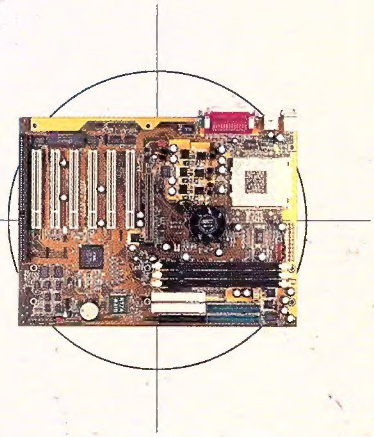
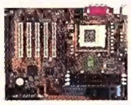
KT7A / KT7A-RAID

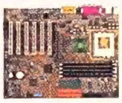
- AMD Socket A CPU
- 3 phase power & Active Cooling
- Onboard ATA100/RAID
- SoftMenu™III





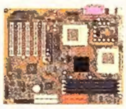
BX133-RAID

- Intel® 440BX chipset
- ATA 100 / RAID
- SoftMenu™III



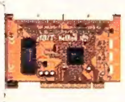
SA6R/SA6

- Intel® 815EP chipset
- ATA 100 & RAID
- SoftMenu™III



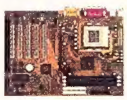
VP6

- Dual PIII motherboard
- ATA 100 & RAID
- SoftMenu™ III



Hot Rod 100

- Ultra DMA 100 IDE controller
- RAID 0 / RAID 1/ RAID 0+1



VL6/VH6

- VIA 693a / 694x chipset 133 Mhz FSB
- On board Audio Codec / 4X AGP
- SoftMenu™II

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